THE PAPER INDUSTRY

A MONTHLY EDUCATIONAL JOURNAL

MARCH, 1933

MAR 13 1933
U.S. Department of Agriculture

1833 CENTENNIAL 1933

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NEW YORK

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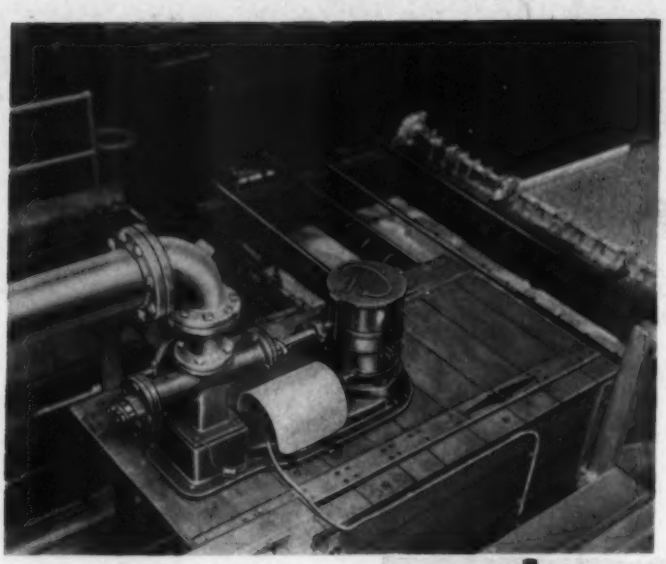

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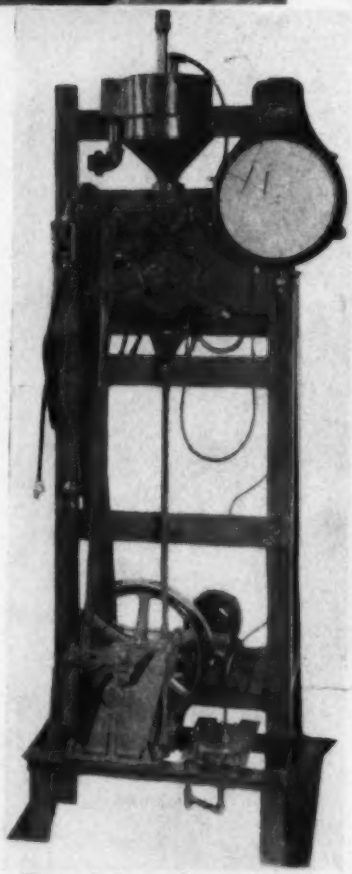

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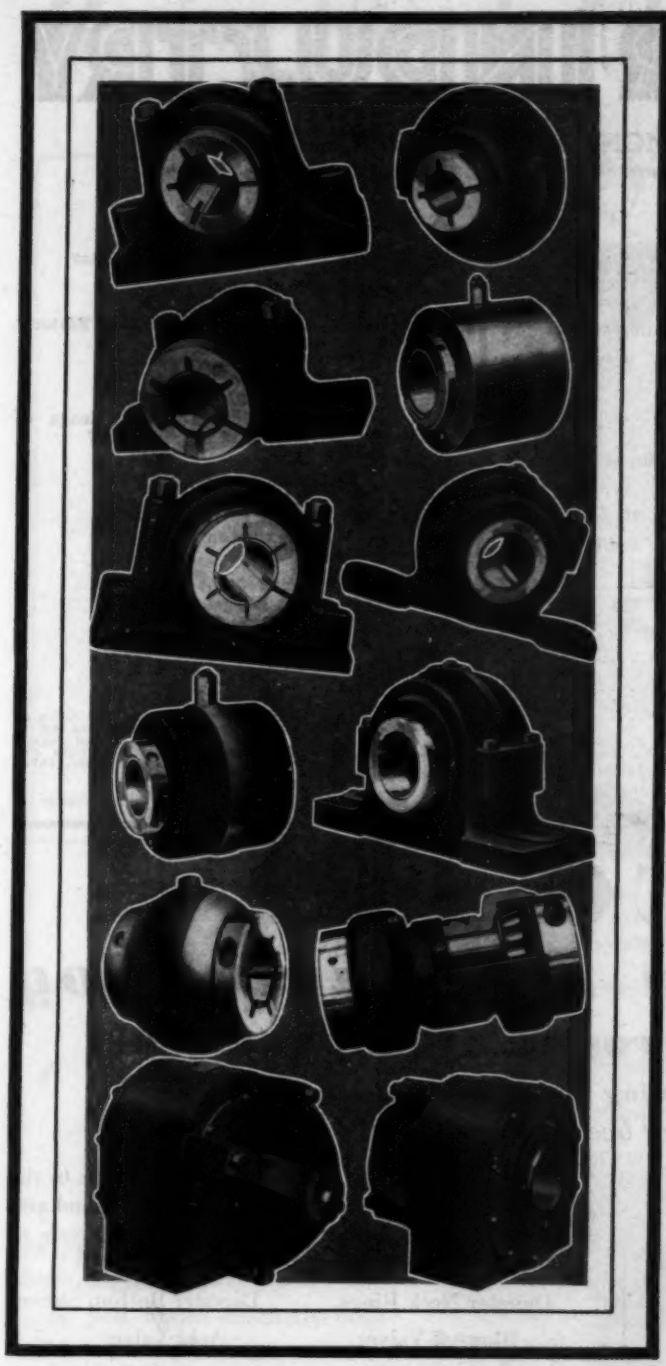

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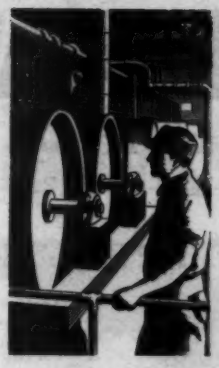

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DODGE MANUFACTURING CORPORATION

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TO DODGE-TIMKEN-IZE IS TO MODERNIZE

THE PAPER INDUSTRY

MARCH, 1933
Vol. XIV—No. 12

A MONTHLY EDUCATIONAL JOURNAL
Devoted to the Interests of the Pulp and Paper Industry

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New York, N. Y.
18 East 41st Street
Lexington 2-0357

Pacific Coast Office
Los Angeles, Calif.
1031 S. Broadway
Westmore 8501

Entered as second-class matter at the Post Office at Chicago, Illinois, February 13, 1920, under the Act of March 3, 1879. Subscription in the United States, Alaska, Hawaii, Philippines, Porto Rico, Cuba and Mexico, $2.00 per year. Canada, $2.50 per year. Other countries, $3.00 per year.

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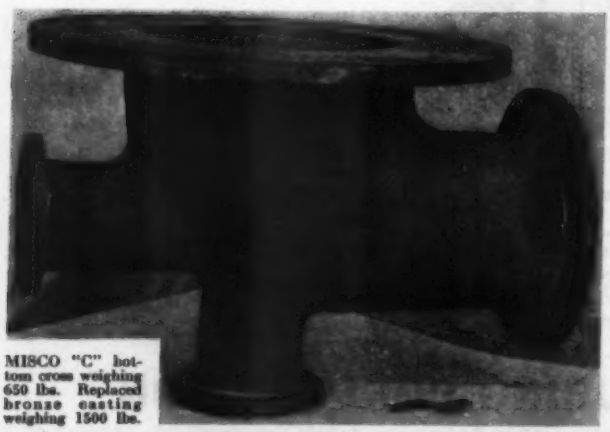
The corrosion resistant alloy

is proof against corrosion by sulphite acids

No MISCO "C" casting in sulphite mill service has ever been replaced



MISCO "C" bottom cross weighing 650 lbs. Replaced bronze casting weighing 1500 lbs.

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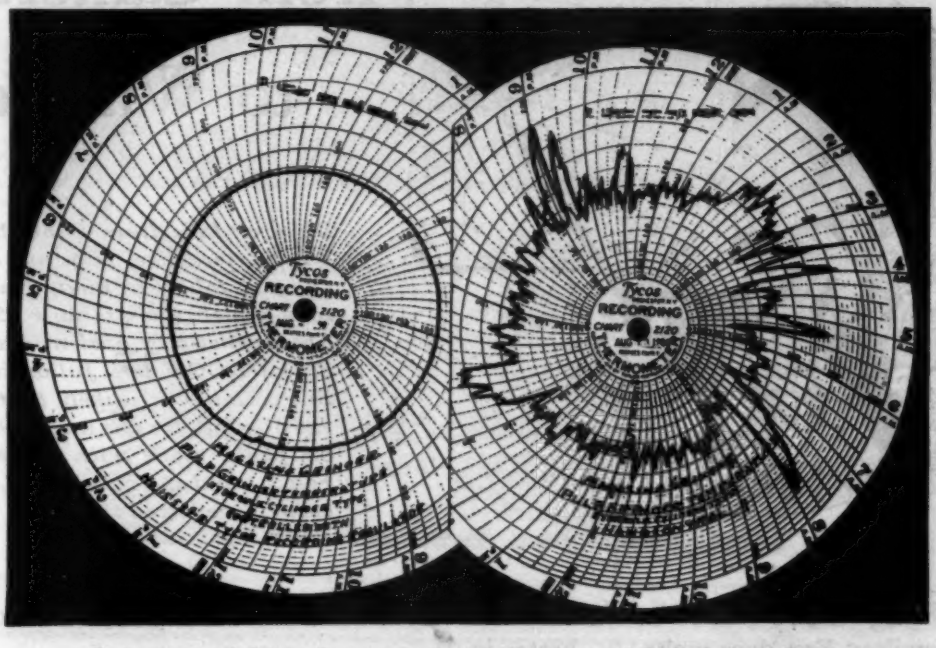
Raise Stock Character and Save Money – THIS WAY



Taylor System of Grinder Temperature Control wins in test made by St. Lawrence Paper Mills Company, Ltd., of Canada. Your own records should be like the one at the left. The St. Lawrence Corporation operates 36 grinders with Taylor Recording Regulators.

The charts say to you, "A Taylor System of Grinder Temperature Control produces more and better pulp with less power and lowest cost."

IF you would assure more uniform, higher quality stock . . .

IF you would eliminate both cold and hot grinding . . .

IF you would increase the life of your stone . . .

IF you would reduce your stone cost per ton . . .

Then install Taylor Grinder Temperature Control in your mill. This system is considered today one of the most important developments of recent times in paper mill operation. It was the first successful one of its type in the industry. It has proved its value in mills in this country and Canada—on magazine, semi-magazine, and pocket-type grinders.

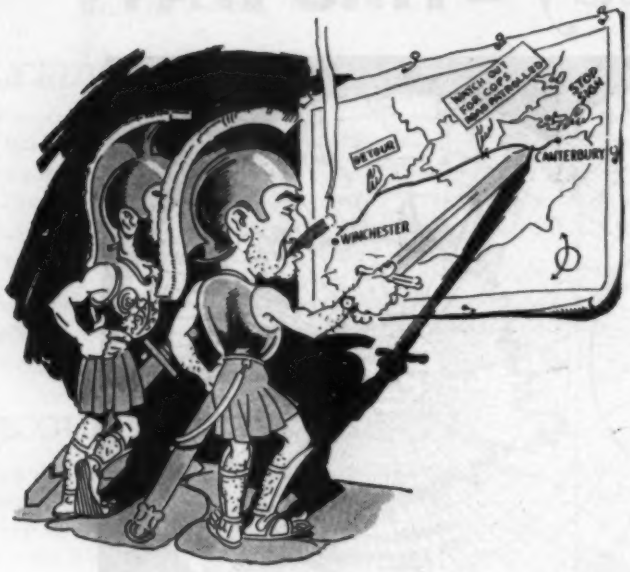
The Taylor Control System is simple, practical, accurate and reliable. In actual continuous operation it controls within such close temperature variation that it assures uniform texture, freeness, color and strength of stock. It saves wear and blistering of the stone and reduces amount of time lost in changing stones.

Get complete information on this proved Taylor System for your mill. Write or wire Taylor Instrument Companies, Rochester, N. Y., U. S. A. In Canada, Taylor Instrument Companies of Canada, Ltd., Toronto, Canada.

Tycos Taylor TEMPERATURE INSTRUMENTS
INDICATING • RECORDING • CONTROLLING

*The name Taylor now identifies our complete line of products, including Tycos instruments.

Caesar used this road map on his trip from Canterbury to Winchester



Drive or hike from Canterbury to Winchester, like pilgrims of old, and you follow in many places the road which Caesar built 55 B. C. This is shown by ancient road map, drawn by Old boy Julius himself. But certainly it's likely that this is the original, for the map was drawn on paper made with a Hamilton Felt . . . and against all odds, should easily have lasted this long.

IT'S remarkable what better paper a Hamilton Felt does make . . . better in every way.

But they're better felts. There's more experience put into them . . . experience that dates back to 1858.

In those seventy-five years Shuler & Benninghofen have learned the secrets of making good felts. Making a felt has not yet, and probably never will be, reduced to the exactness of a cut-and-dried formula.

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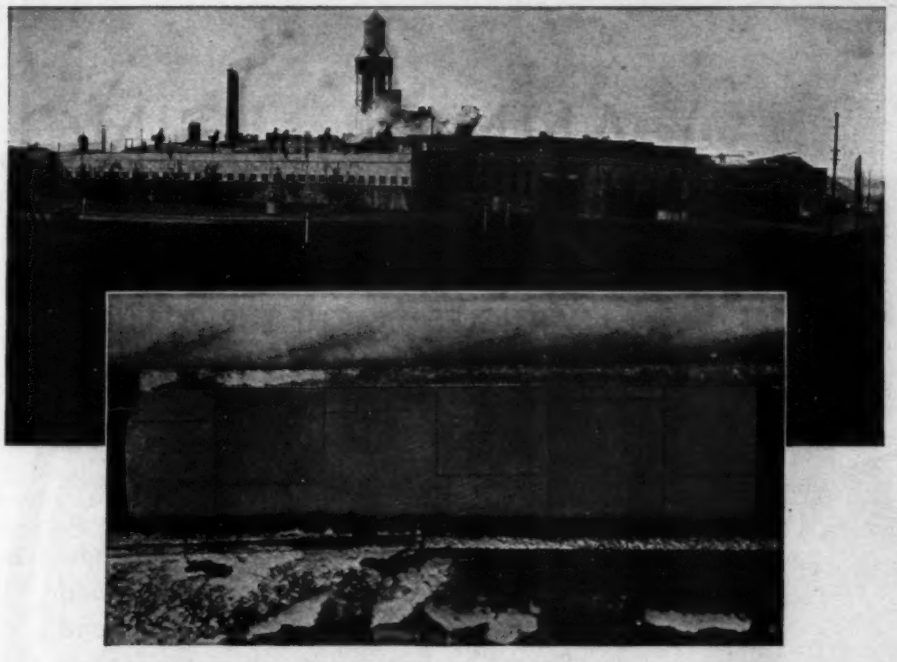
Miami Woolen Mills, Established 1858

Hamilton Felts

Hamilton Felts are marked by two blue lines full width of the felt and by one shorter blue line midway between them.

SINCE 1929 IN CONTINUOUS SERVICE IN THE GREAT MILLS OF PRICE BROS. & COMPANY LTD.



THIS ALOXITE BRAND PULP GRINDING WHEEL

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AFTER all is said and done, it is the proof of performance in such noted mills as Price Bros. & Company Ltd. at Kenogami, that indicates and emphasizes the success of Aloxite Brand Pulp Grinding Wheels.

In this great plant, this wheel is producing, in keeping with Price Bros. standards, a decidedly high quality pulp—effecting real economies in a high production of pulp at low wheel and grinding costs.

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This series of monographs which is being published by the Standard Oil Company (Indiana) will start in the April issue of this publication. Look for it.

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for a permanent blue to tint whites?

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CRODON
The Chrome Plate

- *Reduce costs*
- *Increase operating efficiency*
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- *Improve quality of product*

INCREASED WIRE LIFE . . . .
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Performance records of a paper machine operating at from 650 to 800 feet per minute indicate an average increase in wire life of 30% by use of CRODON-plated covers. Another high-speed machine increased wire life 50%.

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A mill using CRODON-plated covers reports that suction has been doubled, felt life increased 30%, and a sheet obtained with 1½% to 2% less moisture.

IMPROVED SUCTION EFFICIENCY
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Another mill, where it was found necessary to clean wooden covers on an average of once a week, reports that after installing CRODON-plated covers in the same machine, no cleaning whatsoever was necessary during one and one-half years of actual running time.

FREEDOM FROM CLEANING . .
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HARDNESS OF SURFACE . . .
Copper
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Chromium provides the hardest metallic surface available; it is nine-tenths as hard as the diamond. This characteristic of CRODON plate provides protection against wear and abrasion.

REVERSIBILITY . . . . . .
One Side
BOTH SIDES

CRODON-plated metal suction box covers may be made reversible—after one side has served its useful life the cover may be turned over; thus obtaining, in effect, a new cover.

EXTREME SMOOTHNESS . . .
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CRODON

The remarkable smoothness of a CRODON-plated and highly polished surface is of particular advantage here, where the very minimum of friction is desired. This results in marked decrease in wear of wire and felt, and materially prolongs their life.

The most successful applications in the paper industry are on suction box covers, screen plates, press rolls, drying drums, printing rolls, calender rolls, embossing rolls, evaporator tubes and numerous other equipment where decreased wear, elimination of corrosion and extreme smoothness are desired. These are described in Booklet No. 6, a copy of which will be furnished upon request.

The trade-mark CRODON assures the best in chromium plate

Investigate the many definite economies made possible by CRODON. May we have the privilege of assisting you?

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Bank Checks Are Currency

THE topic of the hour is the acute financial condition of the country.

The legislatures of the various states are adopting emergency measures to protect the liquid assets of their banks from withdrawal and hoarding.

The United States controller of currency has been authorized by Congress to allow national banks to take advantage of the state enactments.

These are emergency measures, and evidence of the fact that drastic emergency safety measures must obtain.

There is not a shadow of doubt but that these emergency measures are wise.

It is, moreover, suggested by eminent financial authorities that instead of meeting the national emergency by piecemeal, the protection of liquid assets be undertaken by wholesale, and a banking holiday be proclaimed throughout the nation.

At this writing, eleven states scattered throughout the forty-eight have adopted the emergency bank holiday program.

When states like Michigan and Maryland declare a bank holiday, general business throughout dozens of other states is immediately curtailed. The checks of large corporations doing interstate and foreign business become inoperative.

The business of the country is cleared through checks. Checks are currency. Ninety per cent of the business of the country is cleared through checks. The business of the country can only be maintained or expanded through the circulation of checks. When the circulation of checks stops, business stops.

Only too true is the wail of the Wall Street Journal. "If bankers are bankers, they can take steps to assure the continued circulation of checks as the useful kind of money they have always been."

There's the nub of the situation.

The depositors of forty-two billion dollars in the nation's banks have lost confidence in banks and bankers.

The banking business needs a drastic housecleaning. The industrial and financial racketeers, a number of whom are already under indictment in the state and federal courts and a still greater number who are yet to be indicted, are the responsible parties for this financial curtailment and prostrating blow dealt American business.

The banking business needs reform.

Henry Ford sounded the key-note when he said that if he became a banker in Detroit, his first aim would be to make the bank the safe depository for depositors' funds.

Safe depositories—this unquestionably explains why postal savings are increasing by leaps and bounds and the postoffices of the country are swamped with depositors. The people have confidence in the Government banks.

The restoration of confidence is the first step in the restoration of business, and the way to bring people back into doing business confidently is to assure them of the integrity of the country's banking system.

The integrity of the banking system of America depends upon the integrity of the bankers.

Bad as the situation is, it is prime folly to ignore the facts and attempt to conceal, minimize or protect criminal banking practice.

Look the facts bang in the eye without any palliation of wrong doing and proceed with speed to the re-organization of our banks and bankers on a basis of honesty, integrity and confidence, and the hoarded money will come out of hiding and business expansion will begin.

"What Shall It Profit A Man?"

THE NEED for a real leader in the Pulp and Paper Industry, one who might come forward and lead this industry out of the wilderness of distress back into the promised land of peace and prosperity, was suggested in an editorial which appeared in the February issue of The Paper Industry under the title, "Wanted—A Moses."

Many letters of commendation and encouragement have been received referring to the need for a Moses and requesting that efforts be continued to find the man or men who can deliver the industry from the bondage of obsolescent equipment, overproduction and underconsumption, the evils of foreign exchange, the hardship of the Sherman anti-trust law, the rule-or-ruin policy of some units in the industry, etc.

The thought has been expressed by some that these problems would not be impossible of accomplishment if all men were honest in their dealings with their fellowmen. The average individual is extremely selfish, but this selfishness must give way to a mutual understanding for the good of the entire industry before real progress can be made.

"There must be a change of heart," writes one prominent manufacturer, "before there can be any real improvement, for as long as men will take orders at any price in their desire to injure competition, and at the same time lose money on every pound they turn out, there can be no profit for any one."

There has been too much talk about putting competitors out of business, but when a particular group is put out of business, some other group often takes its place and the physical properties are not destroyed. If a mill goes into receivership, the receiver often operates it in a way that is much more harmful to the industry and makes of it a more dangerous competitor than if it were operated by the men who originally made the investment and were struggling to hang on to it.

In an address at the luncheon of the American Paper and Pulp Association in New York, Dr. Julius Klein stated that obsolescence of machinery in industry had become a greater factor than ever before. He added that more patents had been registered during the past year than in any like period, and there was a need for manufacturers to look squarely into the possibilities of replacing old equipment with new. This scrapping of old, obsolete equipment with a view of lessening overproduction should be one of the industry's major moves and should be started immediately. It is naturally a long drawn out process and can be successful only with the co-operation of most of the operating mills.

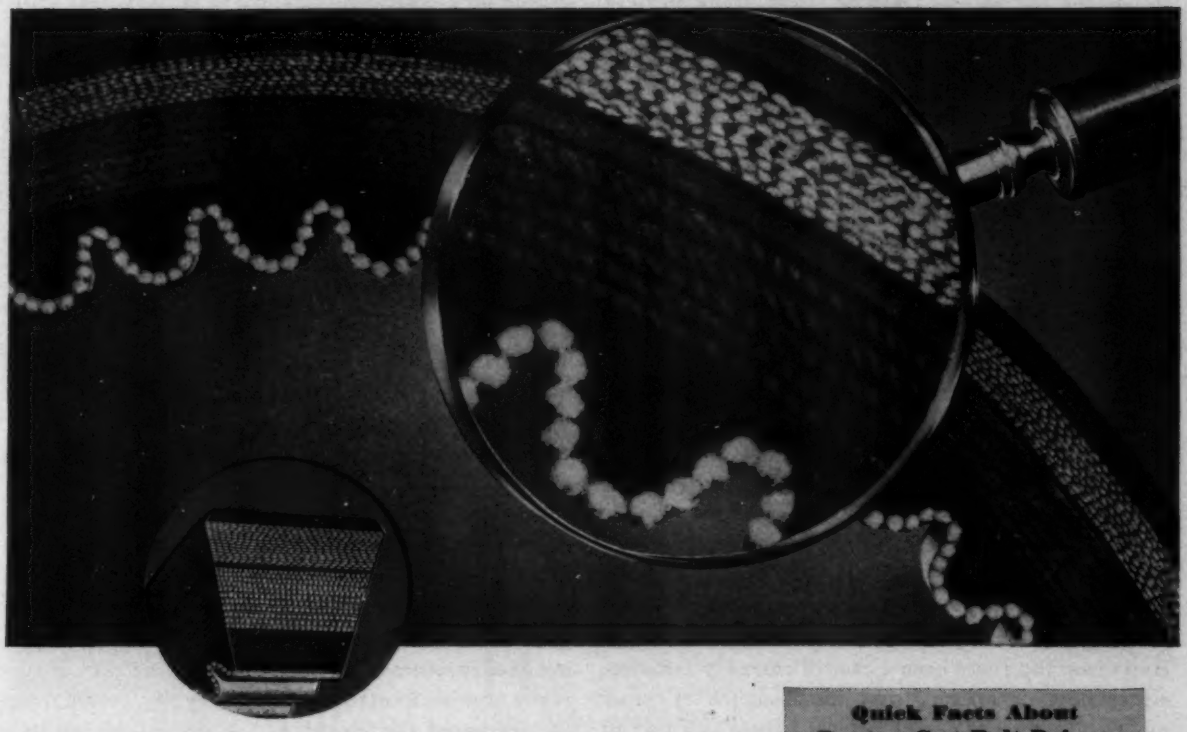
There is little of mutual interest between the major subdivisions of the industry, such as writing, book, tissue, newsprint, wrapping, board, etc. Therefore, we believe that if a common fund were raised to eliminate obsolete plants that each division of the industry should be apportioned a part of this fund and work separately to a common end under one central organization. Such a procedure would tend to prevent individual selfishness in the scrapping of only such mills as belonged to the division of which they might be a part.

It may be necessary to scrap some of the individuals in the industry before the wholesale scrapping of obsolete machinery as well as many other reforms can be accomplished. No one man or set of men can, or should be allowed to, stop the progress of this great industry. If this and all other industries will scrap dishonesty, chicanery, and false reports, suggests one executive, cultivate fair dealing, honest methods and commercial morality, a real Moses would be right there, taking off his shoes, for when he saw those qualities he would know he was on holy ground.

The better elements in all branches of the industry should get together, the heads of the small plant as well as of the large one. Too many people seem to think that bigness alone indicates success, power and dominion. That is what Goliath thought until he met little David. David's faith and not his physical size or strength permitted him to win his victory against what would ordinarily be considered as insurmountable odds. The same situation exists in the competition between the big and small business. It would seem offhand, at least, that the advantage would always be on the side of big business, but such is not the case. There is a place for big business just as there is for the small. Both are probably better because of the competition of the other, and collectively they present a unity that cannot be defeated. Surely, many of the marketing and financial problems of the industry could be solved if there were a more complete understanding on the part of both.

What shall it profit a man if he gets all the orders and then loses money on each one of them?

Greater Gripping Power
with less tension



Sides *die-cut*—not molded—provide another exclusive and important reason for the proved efficiency of Dayton Cog-Belts

A powerful, leech-like grip—less slipping or sliding even with quick starts and stops—less loss of power—less vibration—

—these are some of the many advantages assured by the *die-cut sides* of Dayton Cog-Belts. The raw edges of the die-cut sides contact the sides of the pulley groove and form the driving surface. There's practically no wear. Nor will they ravel. Nor glaze.

Because of this exclusive construction no other V-Belt provides such unfailing gripping qualities—such a steady, uniform flow of power, regardless of speeds—all with less tension, less wear on the bearings.

And in addition to die-cut sides, Dayton Cog-Belts have many other outstanding features. They're the only belts *built to bend*. Because of their cogged inner surface and laminated construction they have far greater flexibility. Even on the smallest pulleys there's no buckling, no distortion, no "squashing" in the pulley groove—*the only V-Belt that combines maximum flexibility with crosswise rigidity.*

And economical, too—cost less to use. They're pre-stretched, so adjustments are seldom necessary. And their *life* is *twice as long* as ordinary belts.

These are only a few of the reasons for the pronounced trend to Dayton Cog-Belt Drives in the power transmission field. We shall be glad to send you all the facts.

THE DAYTON RUBBER MFG. CO.
DAYTON, OHIO

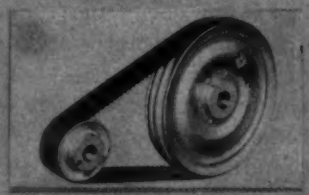
Factory Distributors in Principal Cities and all Westinghouse Electric and Manufacturing Company Sales Offices

Quick Facts About Dayton Cog-Belt Drives

1. Save floor space.
2. *Built-to-bend*—no distortion—no internal heating.
3. Greater gripping power—no slipping or sliding.
4. Stretch removed—fewer adjustments necessary.
5. No dressing or lubrication.
6. Less tension required—easy on bearings.
7. Longer life—belt replacement costs often cut in half.
8. Quiet—Clean—Rugged.

Complete drives—pulleys and belts—in stock. Fractional to 100 H. P.

DAY-STEEL PULLEYS



Investigate the exceptionally low cost of Dayton Cog-Belts with Day-Steel Pulleys

Dayton
COG-BELT DRIVES

The Menace of Inflation

By WILLIAM SIBLEY

IT WOULD perhaps be very surprising if there should not be, just at this time, more or less random talk of inflation. However, such talk is getting beyond the random stage and both industrial and financial leaders need to marshal their forces in resistance to this most ill-advised of all legislation.

During the latter stages of every severe financial depression which has attacked this nation, some campaign to debase currency has always reared its head. This is no more than might be expected, for people everywhere are impatient for the revival of sound business. They chafe at the losses incurred through prolonged inactivity; they entertain hopes for immediate revival; and almost eagerly grasp at any measure which seems to hold out promise of relief. And, since people are poor, since the necessity for more money is uppermost in everyone's mind, the stage is all set for radical, experimental tampering with the currency.

Never has deliberate currency inflation been advocated, but that positive assurance has been given that such arbitrary paper issues were to be controlled, adjusted to the country's need, restrained, or supervised. And never has there been a case of currency inflation, either here or abroad, that the issuance of paper money did not get out of bounds before any sort of stabilization could be arranged. And, in every instance, such inflationary measures not only shattered all public confidence in existing currency but defeated the very purposes these measures were supposed to accomplish.

By the same token, never in all history, has inflation been advocated that such advocacy did not attack the gold standard as being impossible to continue; that it had outworn its usefulness. As a matter of fact, gold is used as a basis for currency redemption only because it commands universal, international confidence. We could make salt water, radium, platinum, pottery, paper or sawdust the basis for a money standard if any one of those things commanded the same universal, world-wide confidence that gold enjoys.

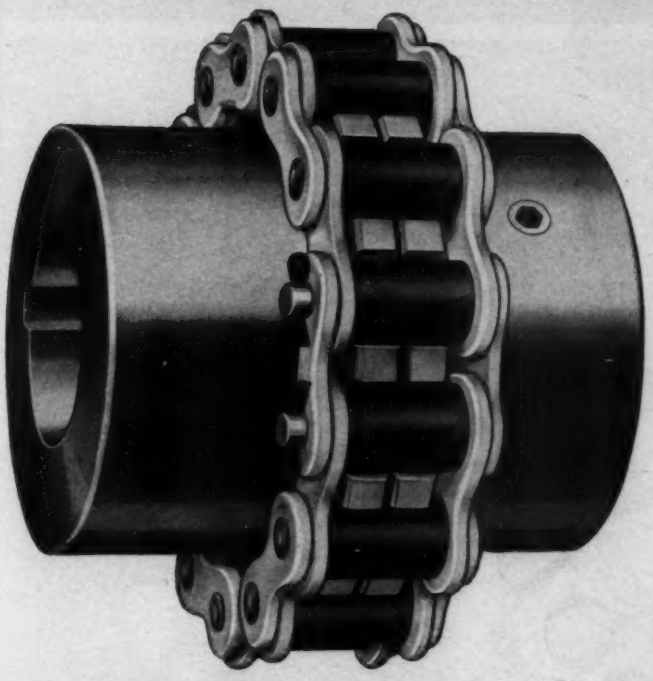
Business will be revived only when manufacturers, merchants and others with payrolls have confidence in the return of profits from the expenditure of either money or effort. Not before. No amount of currency pumped into the banks of the country can possibly effect a revival of business activity or public buying power until there is more employment. And there will be no pronounced increase in employment until confidence in possible profits can be restored.

Confidence is a very uncertain element. We will have it only when we quit talking about it, quit analyzing the reasons for lack of confidence, and stop urging its restoration. Confidence is a state of mind. It exists and works automatically and without conscious effort until we try to apply logic or reason for its existence. Then immediately upon analysis of its existence, it disappears. And the more we urge its return, the farther it recedes. To adopt such artificial measures as currency inflation as a means for forcing the return of confidence is to attempt to bring back the ocean tide with the hose of a vacuum cleaner.

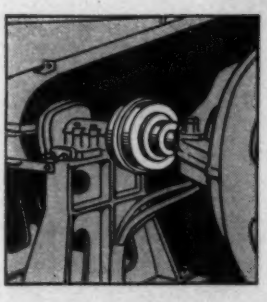
Present-day advocates of currency inflation urge a variety of measures (which in itself proves those advocates incapable of settling so important a matter) the two principles of which are managed currency and a policy of thinning the dollar. To thin the gold content of the dollar from its present 23.22 grains of fine gold to one-fourth or one-half that content would permit the Government to print twice the amount of currency now in circulation. This, they say, would make for increased confidence and a revival of business activity, since it would put more money in the hands of the public. It would be interesting to know what answer these inflationists would make to the question: "If our present dollar carrying 23.22 grains of gold cannot command enough confidence to revive business, how could this be accomplished by a dollar which had only 11.62 grains of gold behind it, or nothing at all except the say-so of the Government?"

No act of Congress instituting currency inflation has ever been passed in the history of this nation. Currency inflation in other countries has brought about a condition of depreciated money values, which, because of the wide disparity between the present values of theirs and ours is causing untold losses both to paper and pulp mills and all other industrial mills. To attempt currency inflation here would mean the loss of our gold reserve to other countries and the serious aggravation of this depreciated currency problem. Let us not permit a handful of ill-advised folks to delay our industrial recovery through the passage of treacherous, confidence-destroying legislation.

Announcing —



THE LINK-BELT "RC" FLEXIBLE COUPLING



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Herringbone Gear Speed Reducers
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Herringbone Gears
Flexible Couplings

HERE is a coupling—designed, built and backed by Link-Belt—a sturdy, reliable and efficient unit, a new member of the Link-Belt Positive Drive family.

It consists of two cut-tooth sprocket wheels (or coupling halves) and a piece of Silverlink roller chain to connect them, all working surfaces being machined to close tolerances. A pin-and-cotter link makes it easy to couple or remove the chain when desired.

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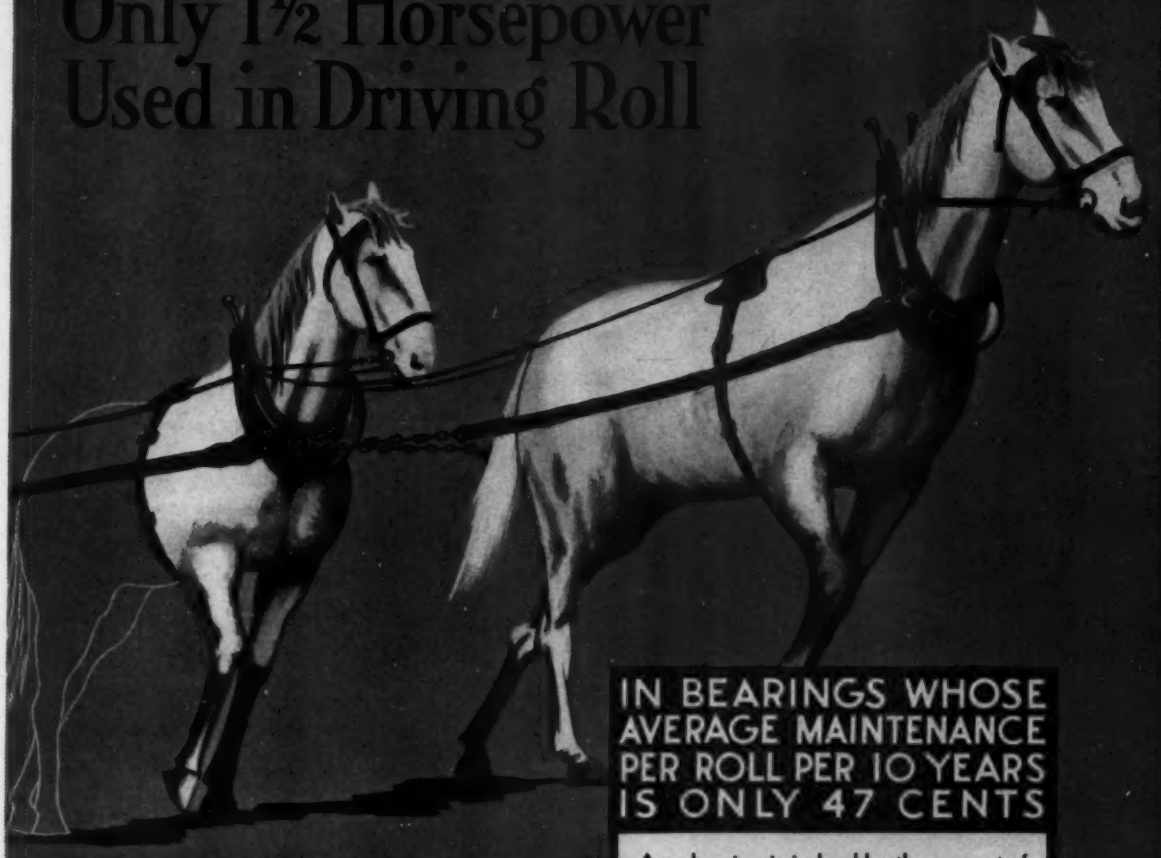

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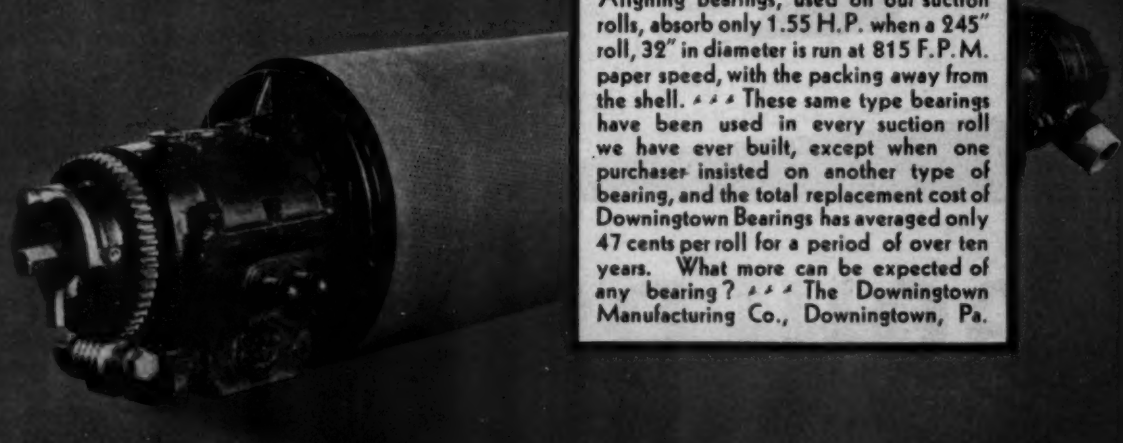
Any bearing is judged by the amount of power it uses and how long it lasts. Downingtown Sealed Sleeve-Type, Self Aligning Bearings, used on our suction rolls, absorb only 1.55 H.P. when a 245" roll, 32" in diameter is run at 815 F.P.M. paper speed, with the packing away from the shell. ⁂ These same type bearings have been used in every suction roll we have ever built, except when one purchaser insisted on another type of bearing, and the total replacement cost of Downingtown Bearings has averaged only 47 cents per roll for a period of over ten years. What more can be expected of any bearing? ⁂ The Downingtown Manufacturing Co., Downingtown, Pa.



BEARINGS GUARANTEED FOR 5 YEARS

100 hp DOES WORK OF 300 hp

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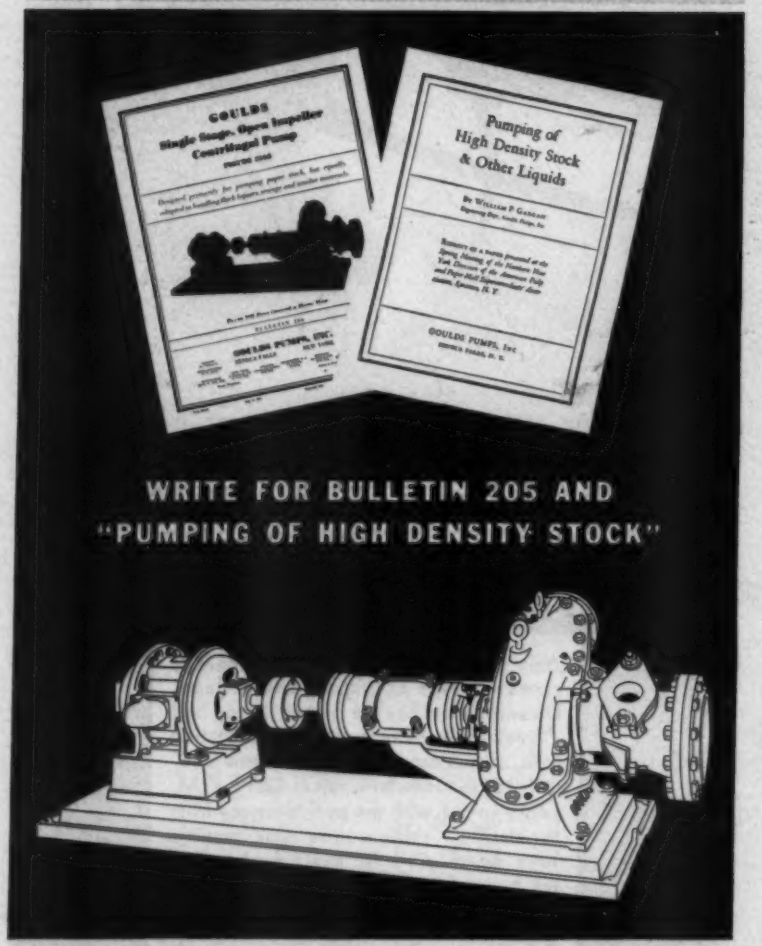

WRITE FOR BULLETIN 205 AND
"PUMPING OF HIGH DENSITY STOCK"

GOULDS PUMPS

SMALL WONDER

at the high standing of Goulds in the paper making industry when performance records are checked.

Think what it means to save ⅔ of your power on an original 300 hp input. That is precisely what Goulds Pumps did in one paper mill. Installed over two years ago, five Goulds stock pumps are still giving absolute satisfaction with 20 hp motors each, whereas the pumps they replaced required 60 hp each. Some saving! 200 hp on a 300 hp operation!

And these pumps are pumping... without clogging or air-binding... coarse, stringy stock ranging in density up to 8%!

Perhaps we can surprise you with savings. Send for Bulletin 205 and "Pumping High Density Stock."

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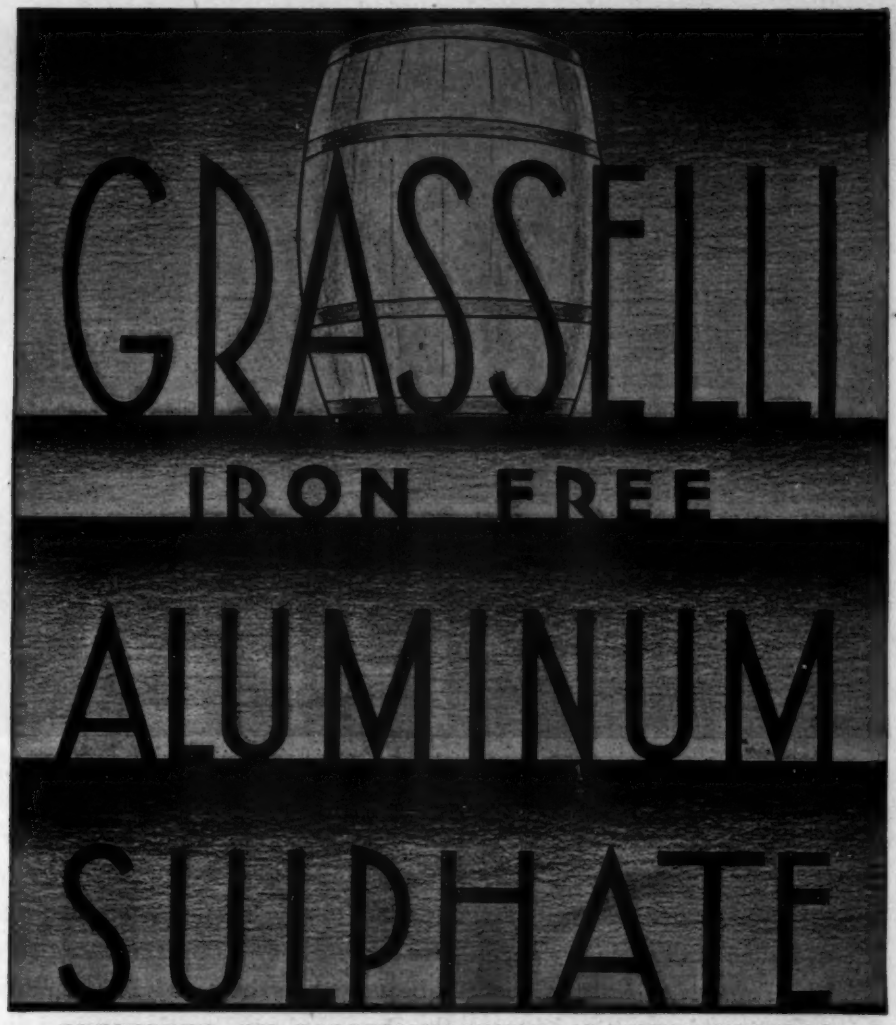
**Save on oil, too, with GOULDS HYDROIL purifiers for lubricating and insulating oils. Formerly made by Hydroil Corporation, Lebanon, Indiana; now made by Goulds.*



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THIS product is more than just a good Aluminum Sulphate, of high quality and uniformity; it is manufactured *especially to meet the critical requirements of the producer of high grade papers.* • Always uniform in its chemical and physical properties. Lump and Granulated. Shipped in barrels containing approximately 400 pounds and in bags containing 200 pounds. • Our research Department may be of help in solving some of your problems. This service is available to you . . . Write, wire or phone any of our branches below.

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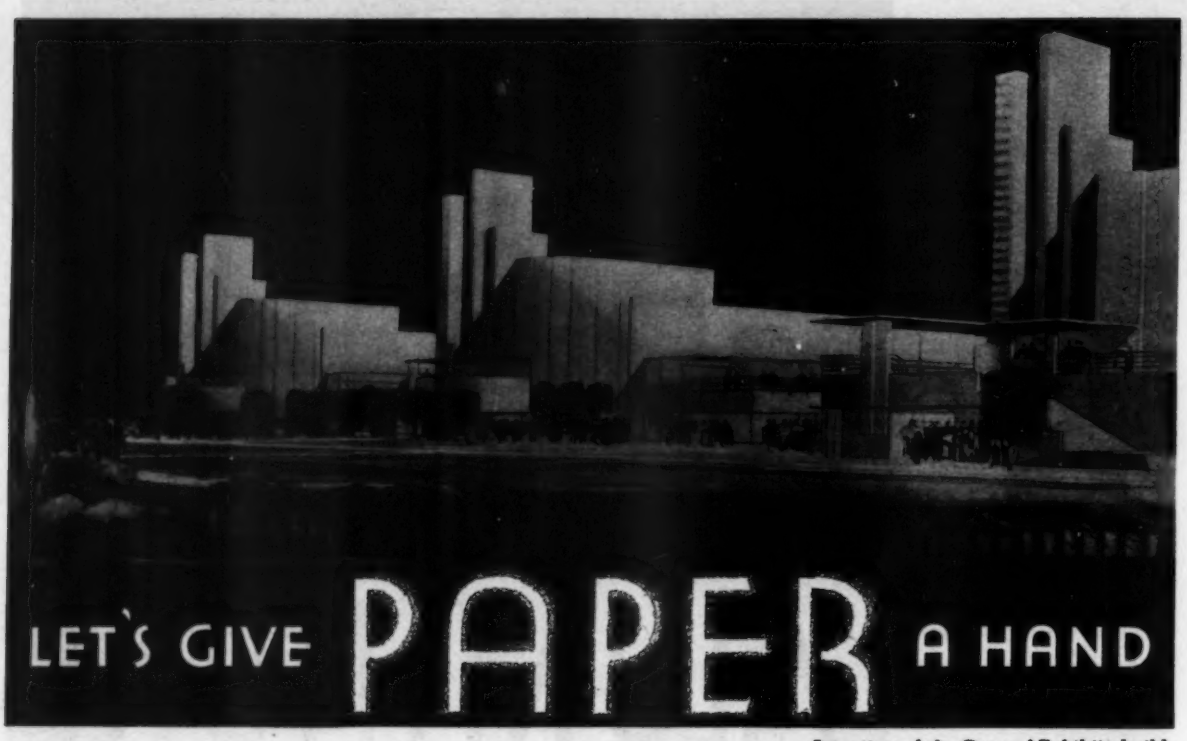


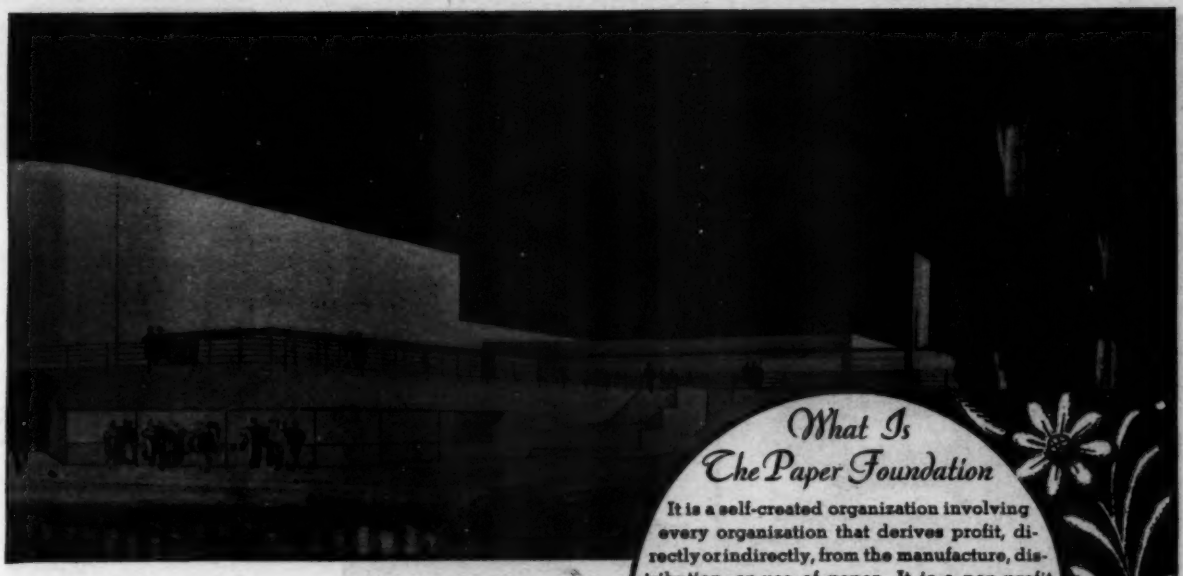
A portion of the General Exhibits building which will house the Paper group

DO YOU REALIZE that the Paper Industry ranks 7th among basic industries! Your own Industry, or this Industry from which you derive profit, is more important than you realize. Not only is it important to you, but it is vitally important to the Nation and to everyone of this country's industries and commercial organizations, as well as in daily domestic life. Paper is so essential that its absence, or a substitute for it, is unthinkable. Through the co-operative plan outlined herein, the Paper Industry can be exalted and new uses stimulated.

You and Your Business Are Concerned Whether you make Paper, convert it, sell it or supply materials or equipment for its manufacture or conversion, your success is not only dependent upon Paper use, but also upon recognition of its real value. No matter what part you and your company individually play in the general scheme of Paper utilization, your interests are definitely linked with its success. The time has come for the Paper Industry to exert itself, it needs the combined co-operation of every individual who earns his salt from the manufacture or conversion of paper. THIS INDUSTRY, OF WHICH YOU ARE A PART, NEEDS YOU AND YOUR SUPPORT. YOUR BUSINESS AND ITS RELATION TO PAPER UTILIZATION WILL BENEFIT BY MAKING THIS NATION "PAPER CONSCIOUS."

COME!
CHICAGO
WORLD'S FAIR

The PAPER
A NATIONAL, BUT NON-PROFIT, ORGANIZATION



What Is The Paper Foundation

It is a self-created organization involving every organization that derives profit, directly or indirectly, from the manufacture, distribution, or use of paper. It is a non-profit alliance of all factors, and representative alike of producers, convertors, merchants and supply organizations. It is wholly dependent upon the co-operation, moral and financial, of all groups . . . SINCE ALL WILL BENEFIT, ALL SHOULD CONTRIBUTE FINANCIALLY THAT THE BURDEN MAY BE LIGHTENED FOR EVERYONE.

The Opportunity of a Century!

An unparalleled opportunity exists for the Paper Industry to present its case to the world at the Century of Progress Exposition at Chicago during next summer. Millions will attend this stupendous exposition that comes at a time when it can be of the greatest good to the Paper Industry. The world will be guests of Chicago. Calculations of attendance indicate at least 50,000,000 . . . Unquestionably, the greatest World's Fair in history. What an opportunity for PAPER! The eyes of the nation will be turned upon the industries that come to the forefront at this business-stimulating display. Here, in the greatest "DISPLAY WINDOW" of all times, THE PAPER INDUSTRY CAN STIMULATE AND GRADE UP ITS BUSINESS.

The Paper Industry Needs Your Help Now!

This appeal is general because there are many of us. But it should be considered personal, and directed to you, nevertheless. This industry of yours needs stimulation, needs increased tonnage, and here at last is OPPORTUNITY. Consider this a personal call for co-operation, expressed in financial support.

Staircase leading to the Hall of Science

The Paper Exhibit will be divided into four divisions: commercial, industrial, domestic and technical. The object will be to present Paper in such a variety of uses that manufacturers will discover new applications for their own industry, or new markets for development. Paper in the home will be featured. The industrial display will feature uses in all industries. The wide use of paper in hospitals, laboratories, shoe factories, and other industries will be shown. Commercial printing papers will be exploited. A model paper machine will be in operation. Continuous motion pictures will visualize THE STORY OF PAPER from tree to finished product.

THE PAPER FOUNDATION, INC. • CONWAY BUILDING, CHICAGO

FOUNDATION

CREATED TO MAKE THIS NATION "PAPER CONSCIOUS"

NO CALENDER CAN BE BETTER THAN THE ROLLS IN IT

A PRODUCT with a BACKGROUND

The superior finishing qualities of Perkins Calender Rolls are the natural result of the longest and broadest experience in the highly specialized art of making calender rolls. ◆ Refills and remakes include the rolls of any manufacture, domestic or foreign, for any application in the paper industry.

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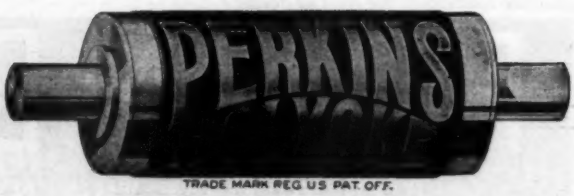
Chilled Iron Rolls	Sheet Calenders	Rag Cutters
Granite Press Rolls	Platers	Stock Cutters
Glassine Supercalenders		Paper Dampeners
		Bleach Ejectors



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The Ace you need to safeguard your production

For design, finish, uniformity, adaptability, quality and service Appleton Felts are the ace that is today helping paper mills all over the country solve their felt problems by meeting present day operating conditions. Made for the definite requirements of the customer, Appleton Felts are good felts—designed and manufactured as only quality products can be—and backed by 42 years' experience. Bring your felt problems to us any time.

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Positive Control

of both temperature and humidity for testing laboratories

View shows interior of typical insulated paper testing room.

Equipment is furnished in several sizes —all adequate to meet outside weather changes.

Accurate in results and simple to operate.

Economical to install and to maintain.

ROSS Conditioning Equipment

Copy of this Bulletin giving description and helpful data sent upon request.

Definite test standards are being insisted upon by purchasers of paper. Without positive control of humidity and temperature, test standards must be as irregular as the varying outside weather conditions. The Ross Air Conditioning System insures uniform conditions for testing at all times throughout the entire year. Standard or any intermediate conditions of relative humidities and temperature are easily maintained by a simple and dependable method of control. The equipment including the Ross Conditioning Unit is complete and compact and low enough in cost to enable any mill to maintain definite test standards.

We invite inquiries from any mill that is considering the installation of a testing laboratory.

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THE PAPER INDUSTRY

A MONTHLY EDUCATIONAL JOURNAL

MANAGEMENT

Controls the Main Highway Out of the Slump

By ARTHUR B. GREEN
Management Engineer

MOST of the pulp came in slush from the sulphite mill and the water from a line of slow sand filters. Out in the storehouse was a reserve of wet laps and that reserve had to be turned over once in a while to prevent ageing and mildew. So, as the system worked out, there were some laps to be handled into the beaters every day, and that was about the extent of the heavy labor. Liberty loan drives were on. Men were being called under the selective draft.

One fine morning, a little after eight o'clock, came a squad of marching men, not in uniform, not in step, but following in well-ordered formation behind a huge, chesty, ruddy-faced fellow in a blue suit and spats, wearing a derby hat cocked a bit to one side, and smoking a fat cigar. Methodically they came up the mill yard, through the lower door, past the entire line of beaters to an empty room at the back. Not five minutes from the time the first appeared they were lodged behind closed doors.

It was pay day. The week before, the beater room force had served notice that if their pay should not be raised from thirty-five to thirty-eight cents, they would walk out on pay-day morning. They had walked out. The marching squad had walked in. To work? What they did behind those closed doors, no one knew. Their big leader left them and disappeared.

On Sunday morning he was around again, looking the ground over. It seemed his name was Mitchell and he hailed from the West. On his well-filled waistcoat he wore a smacking nickel-plated badge with a very official look, but not inscribed with the insignia of the Government. He was, he confided impressively, a detective, under contract for years with the company to keep it free from labor trouble. Already he had the ring-leader of this strike in jail. Mitchell had found that the fellow, being unfamiliar with the technicalities of the English language and the law, had failed to register for the draft, and, patriotically, he had turned him over to the United States Marshal. Would any of the other fellows around that mill start any trouble now? He guessed not. He had not maintained a spotter in each department the past three years for nothing. It did not take him long to know what was going on and who was behind it. And if any more of the men should happen to walk out, he had plenty of papermakers in the back room to take their places. The company didn't need to worry for a minute.

But one thing puzzled this Mitchell. One day, while wandering around the plant, he had gone into a far corner of one of the buildings and there came upon a polished laboratory filled with shining flasks and retorts, hardwood floor, slate sinks, mahogany desk, and behind the desk a man of handsome appearance and faultless style, smoking a cigarette through an amber holder all of eight inches long. He was a doctor of some kind, and he had something cooking in one of the glass flasks that had an obnoxious odor. Mitchell had come upon the Research Chemist.

So the investigator had a new job. For weeks he concerned himself with one idea: he must find out all about this dapper doctor. He found it to be a tough job; it was much harder to break through the discreet and intelligent armor of the plant executives than it had been to draw information from the unguarded conversation of the men in the plant. It took weeks of patience, perseverance and subtle watchfulness, but the story he was after finally pieced itself together. He learned the inside secrets of the doctor's place in the organization.

Schemes and Dishonest Policies

Sometimes a customer would complain about the quality of the paper, but he was not likely to do that more than once. Following hot upon his indiscretion, he would receive a communication in the grand manner

inviting him to spend a few days at the mill so as to have an opportunity for everyone concerned to get together and go right to the bottom of the matter. Soon after his arrival and the expansive reception in his honor, he would find himself seated at a long table with plate glass top, alone in a gathering embracing every man of importance in the mill organization, except the Research Chemist. Every man would hang upon the words of the complaining customer, and breathe sighs at the sight of each damning sample as it came out of his bag. Never before had they seen such evidence. Something must be radically wrong. The boss would appear to be all but struck dumb. Not too dumb—for he would still sense the crisis, and at that breathless moment would ask the operator to call the Research Chemist, suggesting to the gathering that the whole thing should be left just as it was until the doctor could see for himself.

After a proper interval, the door would swing open and there would stand the exquisitely tailored figure of the doctor. Bowing straight-spined from the hips, he would acknowledge his introduction to the customer, then seat himself at one end of the long table. It would seem to take him some time to comprehend that so serious a question could have arisen over the company's product; but once the issue had penetrated, he was alive with explanation, with assurance that the highly technical measures on which he was even now engaged had already been successful in overcoming just the difficulties in question. He could make everything quite clear. Technical language would flow from his lips in impressive manner until he had every man nodding solemn assent and the customer apologizing in sheer perplexity. The next number on that program—a visit to the Research Laboratory, personally conducted by the excellent doctor—would set the customer's mind quite at rest, for he had to believe that between the company and the doctor nothing in the way of papermaking knowledge could have been left out.

What we are dealing with here is *Management*. We are giving it a brief examination according to the case system. Number One has now had its preliminary inspection. We are taking the opportunity, in passing on to Number Two, to be reminded that management, some thirty years ago, was front page news; for a little group of great engineers, who had been devoting lifetimes to the analysis and the practice of management, had found in it a set of natural laws, just as electricity has a set of natural laws. They said that by using these laws as any engineer uses laws of nature in making his designs, management too could be designed and operated to the enormous benefit not only of those engaged, but of mankind as a whole. They said that the object of management was to obtain the maximum prosperity for the employers coupled with the maximum prosperity for each employee, and they showed that neither one of these could be fully and permanently realized without the other.

Let us now leave Number One, deceiving its employees and fooling its trade, and look at Number Two.

A Top-heavy Management

Number Two and Number One have a difficulty in common. Each is in a most competitive field of papermaking; each is a production, or tonnage mill. But Number Two has another difficulty: The mill is in the country on a mountain stream near the woods, while the owners have their homes in the suburbs of a distant city and maintain in that city the offices which do the banking, appropriate the money for expenditures, make the important appointments of men to positions, and conduct the selling. Number Two has "policies." The policies are all born on an operating table in the city offices. A policy may be, but seldom is, suggested at the mill; but never may a policy be determined there.

Number Two makes writing papers; sells them always under its own name, though none of its tonnage is moved by its own salesmen. Instead, it maintains its sales force at the service of its jobbers, who take all the orders, and follow out a scheme of merchandising planned by Number Two. The jobbers are further assisted by a running campaign of national advertising directed at the ultimate users of writing papers who are the customers of the jobbers. Since every pound of its paper bears the name of the maker, it becomes important that every brand adhere to unvarying color and quality, not only for the good name of the manufacturer, but chiefly to enable the ultimate user of writing papers to re-order according to brand and receive a consignment which matches what he already has. In these sentences, note one "policy."

The policy is a large order for the advertisers and salesmen, and an equally large order for the mill. The advertisers and salesmen are in the distant city close to the owners. The mill sees the owners only on stated occasions. Number Two, therefore, spent nearly twenty cents of every sales dollar for advertising and selling, and never quite up to one cent for equipment and methods at the mill that would insure to the trade a line of papers more uniform than the general average of the industry. Had the mill got an equal share of attention with the merchandising, less money would have been required to move the tonnage, because paper can sell in the long run on merit, and Number Two would have contributed substantially to itself and to papermaking.

Still following the case system, we have now taken a preliminary look at Number Two. What finally has happened to each of our cases we shall consider after we have glanced briefly at Number Three.

No Weak Spokes in this Management Wheel

If anything, the line of papers made by Number Three is still more competitive than could be claimed for either Number One or Number Two. Number Three comes into devastating rivalry with tiny units carrying almost no investment, and they all produce rolls and sheets marketed in the same standard put-ups; to the lay purchaser, at least, quite indistinguishable except for the name. Not too well located for national distribution, Number Three is nevertheless big enough to require more than a regional territory, yet each region into which it ships contains a number of small competitors who by every token of bookkeeping ought to be able in their own door yards to undersell it.

But to Number Three, bookkeeping is an implement rather than a guide. About the time when the departmental strike was on at Number One, Number Three closed its city offices and everybody from owners to

broke-hustlers went to work under one roof. Literally *one roof*, for in the mill yard there is no separate office building. The architecture everywhere is for utility. Not even within the mill buildings is there a place especially set off for the brain workers; instead each group works in that part of the mill where it seems to fit best, and if you wish to see more than one group you are ushered from one to the next regardless of the secrets you might see in passing.

As you walk through, you will notice a small battery of the widest paper machines in that division of the industry, and the newest. They will be running faster than you have seen machines run on similar grades. Behind them you will miss the usual cumbersome beater room equipment with its noise and spatter and wet floors. And therein you have already witnessed a secret which presumably you are welcome to copy if you can.

To explain the secret would take you back almost a mill generation, for then was taken the first step in the long, arduous march in which Number Three still moves from one improvement to the next. Specifically, it began with the purchase of the pulps. The mill used two general classes of pulps, and, of course, they varied from shipment to shipment. What were these variations? How did each variation affect mill process or final paper? Would a strong sulphite, say, make a strong paper? Necessarily? If so, how could the mill specify a strong sulphite; know that it received a strong sulphite, and how strong? If not, what factors intervene? What could the mill do to offset the variations in the pulps? How could the variations be known before putting the pulps into process? And what about the manufacture of the pulp? What could he do to obviate some of these variations?

Such a battery of questions plagues every mill. Men often try to satisfy themselves with opinion and judgment. But Number Three undertook to get facts. For instance, though everybody could tell a slow stock from a free stock by seeing it on the machine wire, nobody could tell them apart with any certainty at the beaters, much less tell how far apart they were in points or degrees. That called for a method of testing. When at last a reliable method came out, Number Three was in the front rank of purchasers. In fact, Number Three was already at work trying to develop one for itself.

Step by step, getting one thing after another reduced to some exactness, Number Three came to be known among manufacturers of pulp as one of the most severe but most satisfactory of customers. Turning the same procedure of orderly questioning next upon the beater room, an opportunity was found to simplify it greatly. Analysis, checked by mill scale tests, then by mill daily experience, gradually showed that much of the ponderous, power-consuming, operation of the ordinary beater could be dispensed with to the advantage of the paper, provided the factors which were found to be important could be supplied in a different machine. Hence grew up a new stock-treating method of superior design for the special classes of papers in question. As a process is simplified, it is that much easier to control.

Perhaps it is unnecessary to go further to see why the same orderly procedure of inquiry carried on into the paper machine room gradually brought about wider, faster, newer machines; or to see why the effect on the men was no less; for every man coming to work finds more definite tasks before him, better provision of tools and materials, more competent guidance. At every step of the long upward march, the treasurer and chief accountant are directly involved; their figures take on concrete meaning; even the boss has a hand in every move. Advertising men and salesmen are in the thick of the forward march. Hence, what they have to tell the trade and the public is a story rich in the romance of truth which is stranger than fiction. Number Three has a balanced management. It operates on a sustained program begun years ago, still continuing.

Which Mill Was Most Wisely Managed?

In the interval between our first glimpses of these three companies and the Great Depression, all three had good years. Through the War and for a little time after, Number One profited enormously. Then it entered on a period of decline strangely out of tune with the prevailing business boom. It found it could maintain volume only at the sacrifice of price; for its ability to exact a premium in exchange for the showmanship of its Research Chemist had begun to fade. Boom years, favorable for expansion, found Number One entering upon its first public financing, for lack of reserve, and assuming joint interests with a large combination of interests for the evident purpose of protection. While the company itself verged upon poverty, a few of its officers became rich, and a portion of their time was absorbed by the satisfaction and cares of wealth and the fascination of playing the market.

Up to about the mid-point of the War, Number Two also profited, and added to its record a big increase in volume for a small increase in plant, together with a large reserve in its city treasury. By every test of bookkeeping, its excellent statement were taken as assurance of soundness. Its credit was unsurpassed. From then on, through the boom years, Number Two, like Number One, found that it could maintain tonnage volume only at the expense of dollar volume, for its trade began to realize that its name could not always be taken as a guarantee of exceptional excellence and uniformity in its product. Seeing the trend early, the management was alert to do something about it. At the mill, there was neither equipment nor method of doing work that would support a claim to superior processing or control, but in the city there was a reserve ready and belonging to the company. Number Two built a new laboratory outside the mill; christened it Research; peopled it with an expensive staff; proclaimed it broadly in its advertising. It then increased its appropriations for merchandising out of its reserve. From the new research staff it demanded new grades with which to recapture the market. From year to year as the pressure increased, marketing problems in their technical aspects were taken to the new research staff; the staff became an adjunct to sales, doing everything hastily, working on one problem and another without program, vainly trying to meet sales emergencies as they arose, undertaking nothing important to the art of making paper. By this procedure, the reserve was exhausted without furnishing any protection to the company, and the Depression has simply added to difficulties already overwhelming.

Number Three showed a rising chart of volume and dollar earnings up to the crash in general business.

None of its officers grew privately rich, neither did the company lay up enormous cash reserves. Earnings were rather plowed back into the business to increase its strength and fertility by advancing its methods of doing work, improving its organization, enhancing its services. Earnings were not dissipated by buying into other interests for nominal protection or simply for the satisfaction of being big. Keeping to the engineering spirit in dealing with its problems, keeping a balanced management closely involved in every phase of its work, keeping its resources within its proper field, Number Three reached its peak of greatest strength and highest credit just as the Depression struck.

Through the years of business stress, Number Three has maintained nearly an unbroken running schedule with a full force of workers and a full staff of officers. Prices are, of course, off, salaries and wages down, but the company remains in the black notwithstanding. What probably is still more important, the company continues that orderly inquiry into ways and means which, begun a mill-generation ago, has brought it to its favorable position today, in spite of devastating competition topped off by a general business collapse.

Number One and Number Two both are running fractional schedules; both have laid off men; both have been obliged to disrupt their staff of officers. There is staggered employment for the workers who are retained at all. Both companies are in the red. Both are in need of a program, but since exploitation alone will not work, they have none.

These are, of course, not actual mills, but the facts are actual facts. The instances are drawn simply as types. Number One and Number Two are types common among manufacturers of paper, common no doubt among manufacturers of any kind, with a common distress in the face of economic depression. Number Three is no less a type, though less common, but, nevertheless, enough evidence to have at least one flesh-and-blood example in each major division of the paper industry. Strong compact units, keeping afloat and out of the trough of the economic sea, they do prove something for the merit of those underlying principles of management offered thirty years ago by that little group of great engineers; and it seems fair to say that a depression would be far less of a depression if such units were the rule, rather than the exceptions which prove the rule.

Technical Control in the Sulphate Mill—Part II*

A practical presentation emphasizing critical points in production processes and suggesting means of control

By R. H. STEVENS

A SIMPLE device for measuring specific gravity suggested by Miles B. Hutson[4] is shown in Figure 2. Black liquor from the flow box enters at (A) and overflows at (B). A little water is allowed to drip into the smaller vertical inside pipe at (C). The bottom of this is open, allowing the column of water to balance itself against that of the black liquor. Since the former is surrounded by the latter, both are at the same temperature. So little water is required to prevent liquor from entering the water leg that the dilution is negligible. The baffle (D) is necessary to avoid velocity influence. The height (H) by which the water column exceeds that of the black liquor is proportional to the specific gravity of the latter. This height can be measured by an indicating manometer or by a recording or indicating pressure instrument properly calibrated.

Conductivity methods[5] for washing control also have been employed. The writer's experience with this resulted very well toward the end of the wash, i. e., with liquors approaching zero degrees Baumé, but less satisfactorily with more concentrated liquors. Apparently the difficulties were mainly matters of design, for in two different mills "ammeter control" was seen in the diffuser room. In one of these, however, it was admitted the system sometimes failed.

Whether density, conductivity, or some other property (for example—viscosity) be employed for control the pulp maker is interested primarily in the alkali content. This corresponds very closely with the density. Tables or graphs are generally used to show the Na_2O in pounds per cubic foot for each degree Baumé. Comparison of results of analyses of black liquors from different kraft mills operating on similar wood has shown that these were surprisingly alike in Na_2O content. Probably for mills making bleachable pulp a different relationship would hold. For any one mill, however, a table or graph of Na_2O content vs. specific gravity can be drawn up that will be a safe criterion for technical control.

In addition to the alkali concentration the pulp maker needs to know the total volume of black liquor recovered. For this the writer once experimented with a V-notch weir with integrating meter. Like the specific gravity recorder referred to above this served its purpose admirably except for the troublesome gumming up. The same instrument was afterward installed in another mill and was operating very satisfactorily at the time of the author's last visit there. Orifice-type

*A continuation of article published in the February number of this magazine.

[4]Lyman C. Reed Co., New Orleans, La.

[5]W. N. Greer, Automatic Controls in the Chemical Industry, *Canadian Chemistry and Metallurgy*, Vol. 15, Page 239, Sept. 1931.

flow meters have been used successfully by inserting an oil seal to protect the mercury from contamination. Another method which might be employed is that of calibrated tanks. When one is filled, or another shift comes to work, the flow could be diverted to another tank. An average sample from each tank could be tested and the result recorded on the daily record sheet. Here again foaming and scum formation would offer some difficulty.

Whatever metering process be employed, the results need to be followed up in order to secure efficiency in

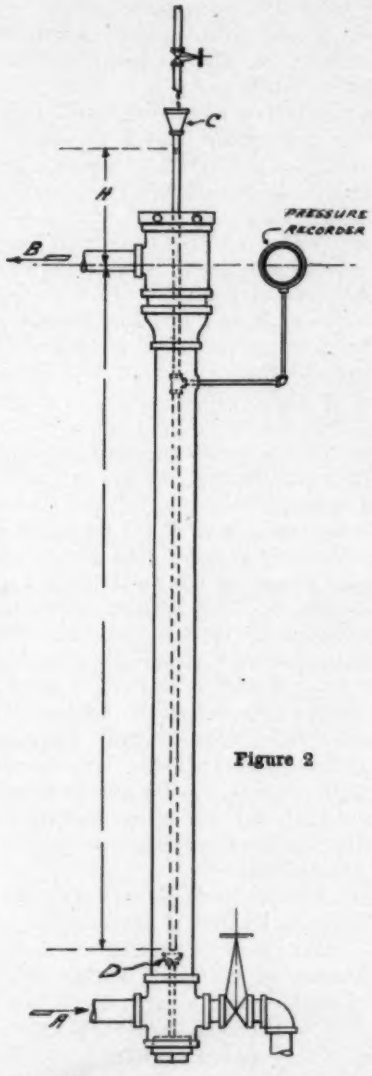

Figure 2

pulp washing. A comparison of the total amount of alkali recovered from the pulp with the total charged into the digesters will usually reveal losses of surprising magnitude. It would hardly be an exaggeration to say that the losses on blowing and washing the cook are approximately one-half the total alkali losses in most mills.

By way of illustration, Figure 3 shows a specimen diffuser room daily record sheet in which the volume and average density of the black liquor are made use of. For ease of calculation, it is assumed here that the

SPECIMEN DIFFUSER ROOM RECORD SHEET

Date.....

Shift 3:00 p. m. to 11:00 p. m.

Cook No.	Diffuser No.	Washing Started at	Washing Finished at	At Start	At End	At End of Shift	Diffuser Foreman	Remarks
24	12	4:15 p.m.	10:45 p.m.	15.0	0	..	L. C. Jones	Ready to dump
25	11	5:30 p.m.	.....	14.9	..	1.4	L. C. Jones	Door leaked

Flow meter reading at 11:00 p. m. = 135,070 cu. ft.
" " " " 3:00 p. m. = 118,640 cu. ft.
Black liquor to storage = 16,430 cu. ft.

Diffusers washed = 10 = 40 tons of pulp

Alkali lost in pulp:
(To be filled in at laboratory)

Avge. grav. recorder reading = 10.2 deg. Bé. = 2.96 lb. Na_2O per cu. ft.
Total Na_2O recovered = 16,430 cu. ft. × 2.96 = 48,640 lb.
Total Na_2O to digesters = 51,110 lb. Active Na_2O = 32,400 lb.
" " recovered = 48,640 "
" " lost = 2,460 "

$$\text{Per cent loss in pulp} = \frac{2,460}{32,400} \times 100 = 7.6\%$$

$$Na_2O \text{ lost per ton of pulp} = \frac{2,460}{40} = 61 \text{ lb.}$$

Figure 3

number of cooks washed was the same as those blown. In practice, this would not always hold and some means for estimating the amount of alkali remaining in the unwashed pulp, or the amount washed from the pulp in excess of that blown, would be needed. It is usually possible to arrive at a fair average figure for the volume of liquor remaining with the pulp in a diffuser. To obtain an average sample of such liquor is, however, far more difficult. Probably the arithmetical mean of the density of the weak wash being pumped into the diffuser and that of the wash liquor coming from it would be a fair approximation. On account of channeling, none of the mathematical expressions for the laws of diffusion can be expected to hold exactly. The per cent loss with the pulp is calculated according to the proposed T. A. P. P. I. tentative standard method.

As in the diffuser room, technical control of the evaporators is usually confined to occasional tests with the hydrometer. Most mills meter the steam consumed and either measure and analyze the waste effluent or employ some form of tell-tale to give warning when the liquor primes over. In only one mill has the author seen flow meters installed before and after the evaporators. The difference between these volumes corrected for temperature difference, is a measure of the water evaporated. The ratio of this to the steam used is a check on evaporator efficiency—provided there have been no boil-overs.

Technical control in the old-type recovery room was largely confined to tests on the green liquor. Here, too, frequently the hydrometer was the only instrument used. Upon one occasion in the author's experience an unscrupulous foreman raised the hydrometer reading by dumping saltcake into the dissolving tank! The effect upon the subsequent operations can be left to the imagination. The modern smelter furnace, designed

for generating steam with waste heat, involves control methods common to most boiler rooms including temperatures, draughts, air pressures on the nozzles, flue gas analyses, etc., as well as maintenance of uniform black liquor density. This last is especially important with the spray-in type of furnace. Adequate chemical control tests involve determinations of the amounts of alkali in the black liquor and saltcake fed to the furnace and of that obtained from it in the green liquor. Of considerable importance also is the amount of sulphide produced. This is a measure of the reduction, for very little of the sulphide charged into the digester gets as far as the black ash.

$$\text{The per cent reduction is } 100 \times \frac{Na_2S}{Na_2S + Na_2SO_4}$$

where Na_2S and Na_2SO_4 represent respectively the concentrations, in Na_2O equivalent, of the sulphide and the sulphate in the green liquor. In Figure 4 is a specimen recovery room daily record sheet covering the

SPECIMEN FURNACE RECORD SHEET

Date.....

J. L. Brown, Foreman — Shift 7:00 a. m. to 3:00 p. m.

Furnace No. 4

Black Liquor Flow Meter at 3:00 p. m.		1,279,590 cu. ft.
" " " " " 7:00 a. m.		1,278,346 cu. ft.
" " fed to disc		1,244 cu. ft.
Average gravity recorder reading, 22 deg. Bé., lb. Na_2O per cu. ft.		6.0
	Total Na_2O in black liquor fed	7,464 lb.
Saltcake fired, 3328 lb.	Na_2O in saltcake,	1,360 lb.
	Total Na_2O to furnace,	8,824 lb.

(From Caustic Room Record)

Total Na_2O in green liquor pumped,	9,580 lb.	
" " " weak " filled back,	1,920 "	
" " from furnace	7,660 "	7,660 lb.
(1295 cu. ft. green liquor)	Na_2O loss,	1,164 lb.

$$\text{Per cent recovery from furnace} = \frac{7660}{8824} \times 100 = 87\%$$

Reduction Test (To be filled in at laboratory)

Na_2O gms. per liter, equivalent of		Na_2S	Na_2SO_4
In green liquor pumped		27.9	3.8
In weak liquor filled back		3.9	1.0
Difference	gms. per liter	24.0	2.8
	lb. per cu. ft.	1.8	0.175

Na_2O equivalent to Na_2S from furnace $= 1.8 \times 1183 = 2129$ lb.
Na_2O equivalent to Na_2SO_4 from furnace $= 0.175 \times 1183 = 206$ lb.

$$\text{Per cent reduction} = \frac{2129}{206 + 2129} \times 100 = 91.1\%$$

Figure 4

performance of one furnace. The data, though in line with reasonable performance, do not represent any particular mill.

The purity of the saltcake used is of more consequence than is often realized. Of the impurities commonly met with, iron and salt are the most troublesome. The latter, because it increases corrosion; and the former, on account of formation of a colloidal double sulphide ($Na_2S \cdot Fe_2S_2$) which retards the settling of the lime sludge. Also, if present in large amount, this may carry over into the digester and discolor the pulp. At least one pulp maker who formerly used to buy bargain lots of off-grade saltcake has since decided it is better business to pay a premium, if necessary, in order to obtain material of highest purity. Fortunately, it is easy to obtain saltcake containing 95 per cent or more of Na_2SO_4. Nitre cake is sometimes used and is preferred by some because it increases the sulphidity of the liquor. Owing to diminished production and increased demand in other industries, nitre cake now costs about as much, per pound of Na_2O, as saltcake. And this material is more likely to be contaminated, particularly that obtained as a by-product from the iron nitre pots of chamber acid plants. Another possible by-product source of alkali is sodium sulphite from phenol manufacture.

Although there are at least two well known systems for continuous causticizing, most of the sulphate mills still employ the batch system. In some, the sludge is settled in the tank to which the lime is added. In others, the settling operation is separated from the causticizing and may or may not be continuous. Present trend is toward lime recovery by reburning in gas- or oil-fired rotary kilns. For this it is imperative, and in any case is advantageous, to clarify the green liquor before causticizing. Whatever system or combination of systems be employed, the efficiency of the carbonate conversion and of the sludge washing needs to be watched very closely. The author has seen lime consumption as low as 400 lb. to the ton of pulp and as high as 600 lb., both without reburning, in mills using approximately the same amount of saltcake per ton. Usually, however, caustic room inefficiency leads to loss of Na_2O as well as of lime. The quality of the lime naturally has considerable influence. Aside from the necessity for a high available CaO content, and minimum MgO, since the latter retards settling, there is little that can be told about quality from the results of chemical analysis. The writer considers actual trial in the mill to be the only satisfactory evaluation test for lime for causticizing.

For control of the causticizing operation, it it necessary to know the amount of carbonate to be converted to caustic, the amount of lime added, and after this is in, the amount of carbonate still remaining unconverted. For the batch system, these will be definite amounts for each batch. For the continuous system, the figures will be in amounts per hour. The titrations involved are perfectly simple. Merely "B" and "C" tests which have already been described. Once the routine is established, it is necessary only to work toward a selected value for "B-C", but the pulp maker usually thinks in terms of per cent causticity.

In too many mills the quantity of lime is measured by tallying wheelbarrow loads, these being assumed uniform. Actually this is far from the case. All lime used should be weighed into the process whether this be batch or continuous. For the latter system, there are dry chemical feeders that will deliver any required amount per hour. For the batch system an overhead

concrete silo with hopper and barrel valve delivering on to an automatic weighing scale makes a neat, dustless and practically foolproof measuring device.

It is customary to boil the liquor with lime for twenty to thirty minutes. This is good practice. The amount of steam required for this is frequently disregarded in estimating costs. This is certainly a mistake, as the amount is far from negligible. Here is another point where recording instruments are a profitable investment; viz., a steam flow meter and recording thermometer; the latter to check up on the caustic room operator. In one mill, the author saw a causticizing tank so large that four or five of the dissolvers were required to fill it. Consequently, it was filled but once on each shift. The caustic room operator had the habit of dumping in the entire quantity of lime for all four or five batches before even the first dissolver was pumped in. Then as soon as the lime had slaked he turned on the steam and kept the pot boiling for hours. Not only did he waste steam, but alkali as well. For, though this mill had a fairly low lime consumption, the saltcake requirements were excessive. The prolonged boiling and agitation led to formation of Gaylussite $CaCO_3 \cdot Na_2CO_3 \cdot 6H_2O$ which carried down alkali with the sludge in spite of all that decantation washing could do.

Settling the sludge is always a tedious operation and likely to cause delays when these are most inconvenient. The use of starch as a coagulent has been found of value in this operation and should prove similarly useful in green liquor clarification.

Sludge washing on filters is now practically universal. Continuous suction filters are more usual though some pulp makers still cling to the pressure filter believing they obtain better washing efficiency thereby. Whatever washing system be used, the sludge should be carefully sampled and tested for alkali regardless of whether it is to be discarded or reburned. At first glance, one might suppose that less precautions need be taken with washing out soda from sludge that is to be reburned, since this would be recovered anyway. Actually, the reverse is true, for the alkali may form with the lime and silica (which is always present to some extent) what is practically a soda lime glass. This is, of course, insoluble in the green liquor and entails loss of alkali.

For really accurate technical control of the sulphate mill, there should be, in addition to the daily record sheets of each department, a periodical trial balance just as in any other form of accounting. Although "pounds Na_2O" may not look much like "dollars" on the printed page, nevertheless each represents property, and the former can have just as much to do with profit and loss as the latter. If the mill shuts down week-ends, then while the pumps are idle is a good time to take an inventory of the amount of chemicals on hand in the different departments. If the mill operates continuously without rest, then it is necessary to devise some method of taking an inventory on the run. This may tax the ingenuity of the chemist, but it can be done though a static inventory is not only easier but more likely to be accurate.

Such an inventory will always show either a gain or a loss in the total pounds Na_2O in the system as compared with the preceding one. This gain or loss should be taken into consideration in calculating the chemical consumption per ton of pulp. Failure to do this may cause apparent fluctuations in this figure of rather violent character.

INVENTORY FOR THE WEEK ENDING.....	.....
Production, tons of pulp	909.5
Average per day	151.5
Number of cooks made	287.
Number of tanks of green liquor made	175.
Cooks per tank	1.75
Digester yield	3.17
Tons pulp per tank	5.54
Average tank yield cu. ft. liquor	502.
Average tank yield active Na_2O	3,460.
Average tests total and active (B and C tests)	20.85-17.80
Average active Na_2O per ton	665.
Average active Na_2O per cook	2,120.
Total Na_2O to digesters	937,959.
INVENTORY lb. Na_2O	
White liquor	131,140.
Weak liquor	1,151.
Green liquor	13,263.
Black liquor	80,078.
TOTAL	225,632.
Saltcake used	292,500.
Saltcake in terms Na_2O	119,925.
Na_2O on hand last inventory	216,340.
Na_2O in transit	336,265.
Na_2O on hand this inventory	225,632.
Na_2O consumed	110,633.
Saltcake equivalent consumed	269,830.
Saltcake consumed lb. per ton of pulp	296.
Total Na_2O from furnaces	754,318.
Average Na_2O per furnace hour	1,078.
Per cent reduction	87.6
Per cent recovery	87.1
Cords wood used	1,686.
Cords wood used per ton	1.85
Cords wood used per cook	5.86
Lime used, lb.	484,000.
Lime used per ton of pulp, lb	531.
Pounds of steam to evaporators	2,770,100.
Pounds of steam to evaporators per ton pulp	3,040.
Pounds of steam to digesters	2,924,000.
Pounds of steam to digesters per ton of pulp	3,220.

Figure 5

By way of illustration, a weekly inventory sheet of this type is shown in Figure 5. In this the Per cent Recovery is obtained by dividing the Total Na_2O from the Furnaces by the sum of this figure and the Na_2O Consumed, and multiplying the quotient by 100. The proposed T. A. P. P. I. Tentative Standard Method for Recovery Room Practice bases the Per cent Recovery on the Total Active Alkali to the Digester. Making the calculations in this way does not change the figures shown in Figure 5 by as much as 1 per cent. However, for the sake of securing uniform practice so that pulp makers in different mills can compare the efficiencies of their respective operations, it is much to be desired that whatever basis may finally be adopted should be strictly adhered to by all.

❖ ❖ ❖

◆ THE MANUFACTURE of wall paper as a substitute for ancient hanging of tapestry or cloth was begun about the year 1640, according to published references.

Simplified pH Control

Its fundamental principles and methods of application discussed

By W. R. KENNY and A. B. REED
Research Department
The LaMotte Chemical Products Company

EMERGING from the stress of the recent economic upheaval, it is certain that the producer of pulp and paper views the future with a determination to assemble every means of securing greater efficiency throughout his operation, and to offer his operating department every incentive to maintain the production of a uniform quality of finished product at the lowest possible cost. Modernization of plant and complete chemical control within the processes are being universally adopted as the most effective weapons to meet competition in the present markets of uncertain price levels. Since the use of pH control is one of the important factors involved in the standardization of these chemical processes, it is appropriate at this time to present a discussion of its fundamental principles and methods of application.

Meaning of pH Control

While the term "pH" has become a common expression among technical workers everywhere, its adoption has been so rapid in recent years that many workers do not have an altogether clear understanding of its meaning, and many hesitate to use simplified pH control because they believe it requires some highly specialized training. This is obviously untrue, for the actual technic of making pH measurements is almost as easy as measuring the temperature of a solution with a thermometer.

Substances have long been classified according to their acidic or basic properties, and many instances could be cited in both industrial and scientific work where an accurate control of these factors was essential, yet before pH measurements were available there was no satisfactory method that was sufficiently sensitive to be of general use.

Indicator test papers, of which litmus is the classic example, were used to roughly indicate the acidity or alkalinity of a bath, but litmus furnished only a rough qualitative idea of the concentration of hydrogen or hydroxyl ions of a bath, and its use was largely confined to indicate the endpoint of a titration. Titration procedures were also widely used, but these gave only a measure of the total acidity or alkalinity of a bath, and, except in rare instances, gave but little information regarding the active acidity or alkalinity. This made positive control difficult to maintain, especially when it is recognized that substances such as hydrochloric, phosphoric and acetic acids of the same strength as measured by titration gave such widely different results in practice.

The Dissociation of Acids and Bases

According to the theory of ionization, when an acid, base or salt, is dissolved in water, it breaks up into ions, which are atoms or groups of atoms carrying positive or negative charges of electricity. The dissociation of several acids and bases may be illustrated as follows:

$HCl \rightleftarrows$	H^+ +	Cl^-
Hydrochloric Acid	Hydrogen Ion	Chloride Ion
$H_3C\ COOH \rightleftarrows$	H^+ +	$H_3C\ COO^-$
Acetic Acid	Hydrogen Ion	Acetate Ion
$NaOH \rightleftarrows$	Na^+ +	OH^-
Sodium Hydroxide	Sodium Ion	Hydroxyl Ion

From these examples, it can be seen that acids liberate hydrogen ions and bases liberate hydroxyl ions.

All acids and bases do not dissociate to the same extent and, therefore, the same concentrations of acids and bases as measured by titration do not furnish the same quantities of hydrogen ions to the solution. Thus, hydrochloric acid, which is termed a strong acid, dissociates to the extent of 91.4 per cent at 18 deg. C. This means that out of every 1000 molecule of HCl, 914 are split up into H+ and Cl− ions. Acetic acid, which is termed a weak acid, dissociates to the extent of only 1.34 per cent. This difference, which is readily apparent in the reactive properties of the two acids, cannot be shown by titration procedures, but is immediately detected by hydrogen ion or pH measurements.

Dissociation of Pure Water

Pure water, which may be designated as HOH, dissociates as follows: $HOH \rightleftarrows [H^+]+[OH^-]$, into equal quantities of hydrogen (H^+) and hydroxyl (OH^-) ions. Since the hydrogen and hydroxyl ions are present in equal quantities, pure water is said to be neutral.

With pure water, this dissociation takes place to only a very limited extent, probably only one molecule in 555,000,000 being split apart. The dissociation constant of pure water at 22°C, expressed as the product of the hydrogen ion concentration times the hydroxyl ion concentration ($[H^+]\times[OH^-]$) is 1×10^{-14}. Since both ion concentrations are equal, then each is equivalent to 1×10^{-7} grams ions per liter.

If an acidic substance is added to water, there will be present hydrogen ions, not only from the dissociation of the water, but also from the dissociation of the acid, as well. Therefore, the concentration of hydrogen ions will exceed the concentration of hydroxyl ions and the solution will assume an acid reaction. Likewise, the addition of an alkali will cause the solution to assume a basic reaction. Since the product of the two ion concentrations must remain a constant ($[H^+]\times[OH^-]=K$), an increase in either hydrogen or hydroxyl ions must be compensated for by a proportionate decrease in hydroxyl or hydrogen ions.

From this illustration, it can be seen that even pure neutral water contains minute quantities of both hydrogen and hydroxyl ions. In neutral solutions they are present in equivalent quantities. As the solution becomes acid, the hydrogen ions predominate, while in alkaline solutions there is a preponderance of hydroxyl ions. For convenience, the hydrogen ion is taken as the unit of measurement, although measuring hydrogen ions one also has a measure of the hydroxyl ions, for it must be remembered that even in the most acid solutions there still remains a small amount of hydroxyl ions, and in alkaline solutions there are always present some hydrogen ions.

The pH Scale

The mode of expressing hydrogen ion concentration in terms of numerical values is very awkward. For instance, the actual hydrogen ion concentration of pure water would be expressed as 0.0000001 or 1×10^{-7} numerically. However, this has been simplified by using the term pH, which means the logarithm of the reciprocal of the hydrogen ion concentration. The pH value equivalent to 1×10^{-7} would be derived as follows: $pH=\log\frac{1}{10^{-7}}$ or pH 7.0. If the hydrogen ion concentration were 1×10^{-4}, 1×10^{-8}, 1×10^{-9}, the pH would be 4, 8 and 9 respectively.

The range of the present pH scale is between 0 and 14. The mid-point is 7, which is the pH of pure water, and the true neutral point. Values higher than pH 7.0, such as 7.2, 7.4, 8.0, 9.0, 10.0, etc., denote alkalinity, the degree of alkalinity *increasing* as the numbers *increase*. Analogously, any values lower than pH 7.0, such as 6.8, 6.6, 6.0, 4.2, 2.0, etc., denote acidity, the degree of acidity *increasing* as the numbers *decrease*. A pH value is, therefore, simply a number denoting the degree of acidity or alkalinity of a solution.

Buffer Action

Buffer solutions or regulators, whose purpose it is to maintain a definite pH value in a solution under all conditions of use, find wide application in the paper industry. The mechanism of buffer action may be explained by the following illustrations.

A solution exerts buffer action when

Indicator	pH Range	Color Change
Acid Cresol Red	0.2 — 1.8	Red — Yellow
Meta Cresol Purple	1.2 — 2.8	Red — Yellow
Yellow	2.6 — 4.2	Red — Yellow
Bromphenol Blue	3.0 — 4.6	Yellow — Blue
Bromcresol Green	3.8 — 5.4	Yellow — Blue
Methyl Red	4.4 — 6.0	Red — Yellow
Chlorphenol Red	5.2 — 6.8	Yellow — Red
Bromthymol Blue	6.0 — 7.6	Yellow — Blue
Phenol Red	6.8 — 8.4	Yellow — Red
Cresol Red	7.2 — 8.8	Yellow — Red
Thymol Blue	8.0 — 9.6	Yellow — Blue
Oleo Red	8.6 — 10.2	Yellow — Red
Purple	9.6 — 11.2	Purple — Red
Sulfo Orange	11.0 — 12.6	Pale Yellow—Deep Orange
Violet	12.0 — 13.6	Red — Blue

Figure 1

considerable quantities of acid or alkali can be added to it without causing an appreciable change in pH. Consider the case of a solution of sodium acetate and acetic acid. In this solution the dissociation of acetic acid is very small:

$H_3C\ COOH \rightleftarrows H_3C\ COO^- + H^+$
Acetic Acid — Acetate Ion — Hydrogen Ion

The dissociation of sodium acetate is, however, large:

$H_3C\ COONa \rightleftarrows H_3C\ COO^- + Na^+$
Sodium Acetate — Acetate Ion — Sodium Ion

Now suppose that a small quantity of hydrochloric acid is added to this solution. This largely dissociates into H^+ and Cl^- ions. Then there are H^+, Cl^-, Na^+ and $H_3C\ COO^-$ ions in solution. Since free H^- and $H_3C\ COO^-$ ions cannot exist together in solution, except in very limited quantities, they combine to form undissociated acetic acid, and the solution contains only about the same number of H^+ ions as originally existed, and the pH value is unchanged.

If, on the other hand, sodium hydroxide, which is largely dissociated into Na^+ and OH^- ions, is added to the acetic acid-sodium acetate buffer, the following reactions will occur:

One now has present in solution Na^+, OH^-, H^+ and $H_3C\ COO^-$ ions. Since H^+ and OH^- ions cannot exist in solution, except in definite proportion, they will combine to form undissociated water (HOH). Since there is a large amount of undissociated acetic acid in the solution, more of it will then dissociate into $H_3C\ COO^-$ and H^+ ions, and the pH of the solution will be practically the same as it was before.

Unbuffered Solutions

Unbuffered solutions do not possess the ability to resist change in pH on the addition of acids or alkalies, which may be shown by this example:

Pure water has a pH value of 7.0. If 1 cc. of a very dilute solution (0.01N) of hydrochloric acid is added to a liter of pure water, the pH value will be changed to about 5.0. This is a change of 2 pH units, and shows that pure water is totally unbuffered and without ability to withstand change from even minute quantities of acids or alkalies.

Methods of Determining pH Values

The most widely used methods for determining pH values fall into two general classes; namely, the electrometric or potentiometric method, and the colorimetric method. In the electrometric method, the solution to be tested is made a component part of a cell. The voltage produced by the cell is a measure of the pH of the solution. The colorimetric method, being simpler and involving the use of less expensive equipment, is better adapted to routine control work. In this method, use is made of certain dyes which have the property of changing color in solutions, depending on the pH value.

The dyes or indicators most suitable for this work are those which show a distinct color change over a relatively short pH range. By using indicators which change color at different points on the pH scale, determinations may be made over the range from 0.2 to 13.6. Figure 1 shows a list of dyes commonly used, together with their color changes and the pH ranges over which the color changes take place.

In making a determination on a solution where even the approximate pH value is unknown, preliminary tests are first made to establish the indicator with which the final test can be made. Bromthymol Blue is usually selected for the first test, since it covers the neutral point 7.0, and shows whether a solution is acid, neutral, or alkaline. A few drops of the indicator solution is added to a small quantity of the sample in a test tube. If the color of the mixture is yellow, the solution is acid. If a blue color appears, the sample is alkaline. In the next test the next indicator on the acid or alkaline side of Bromthymol Blue is used, depending on whether the color developed in the first test was yellow or blue. Successive tests are thus made until a mixture of an indicator and the sample shows a color intermediate to the colors at the extremes of the indicator range.

Having found the proper indicator, a final test is made by adding a definite volume of indicator solution to a measured amount of the sample. The color developed is compared with color standards representing the shades of color corresponding to definite pH values within the indicator range. The pH of the sample is assumed to be the same as the pH of the standard which the mixture of sample and indicator matches in color. If it lies between two standards, the average of the two is taken as the pH of the sample.

There are various types of standards, which are prepared by adding indicator solution to buffer solutions of known pH values, the proportion of indicator to solution being the same in the standards as it is in the test mixture. Comparisons of test mixtures and standards are made in tubes of equal size, so that the color of the same thickness of solution is observed in all the tubes. The interference of turbidity and color in the sample is eliminated through the use of a small comparator, such as is shown in the foreground of Figure 2. In comparing the test mixture with the standards, the tubes are so arranged that the standards are viewed through tubes containing portions of the sample, and the test mixture is viewed through a tube of

Figure 2

clear water. Thus a comparison is made of the same thickness of solution containing the same elements of color and turbidity. It is often necessary to use this method in the preliminary tests on turbid or colored solutions.

Process Applications of pH Control

In discussing the application of pH measurements to the processing of pulp and paper, it will obviously be impossible to give definite optimum pH ranges advantageously used at one mill and expect this same value to hold for all other mills. It is important that the workers in each mill establish definitely the best conditions for their own operation. Having determined the pH zones, it is a very simple matter to maintain them in routine operations.

The sizing operation is, perhaps, one of the most important steps to which pH control was first applied. In rosin sizing, it was formerly customary to secure what was known as "a slightly acid condition" and to precipitate the sizing on the fibers in this manner. This often resulted in an extensive waste of alum, together with creation of considerable trouble due to the excess of alum being carried along to subsequent steps in the process. With pH control the minimum amount of alum to obtain the best sizing results can be predetermined and routinely adhered to. Extensive experimental work has shown that the optimum pH range for the sizing operation, varying only slightly from mill to mill, will probably extend from 4.0 to 6.5.

The retention of fillers increases as the pH rises from 4.0 to 5.6. It has also been shown that the amount of dyestuff retained by the fibers is influenced by the pH of the beater furnish. The ultimate shade of the dye will vary with the pH value. pH control in the manufacture of satin white and blanc fixe is an important factor, and strict adherence to an established pH range for this operation is necessary for routine efficiency.

By properly adjusting the pH value of the stock, it has been found possible to eliminate the deposition of pitch on the wires, press roles, and felts. In one mill it was shown that when the pH of the stock was adjusted with alum to a value of 4.3, the gumming of the rolls entirely disappeared.

The economical utilization of white water is one of the problems constantly confronting mill chemists. In the first place, the white water contains recoverable materials of value, and it is estimated that the loss per year through this avenue of waste runs into many millions of dollars. This total loss can be materially reduced by the treatment of white water and the recovery of possible by-products.

The proper utilization of white water involves some form of treatment rendering it suitable for introduction into the primary water supply system, or for use in subsequent operations in the mill. In many mills the water is submitted to a coagulation treatment using chemicals of low cost and adjusting the pH to a point where proper sedimentation results. Some mills obtain best coagulation at pH values varying from 4.0 to 5.0. During the coagulation process, the precipitated substances settle out and may be ultimately recovered, depending upon their value to the operation. Water thus treated is then passed on to the mill reservoir or a suitable storage pond for re-use.

In many cases, pH control has been effectively applied to the water passing over the rolls on the paper machine. Paper machines which are continuously subjected to the corrosive effect of water with a low pH value will depreciate rapidly, whereas such corrosive action can be almost entirely eliminated by properly adjusting the reaction of the water. Furthermore, the properties of the finished paper are greatly influenced by the residual acidity of the fibers, and this matter is being extensively investigated by the Bureau of Standards. It has already been found that an acid paper deteriorates very rapidly and, in addition, gives rise to a great deal of corrosion of press type and plates. Some large publishers are actually specifying pH values for the paper which they purchase in large quantities, in order to avoid losses of this nature. It has been found that papers leaving the machine at a pH value close to the neutral point have better keeping qualities than acid or alkaline papers, an extremely important factor for the consideration of those producing book paper.

Other Uses of pH Control in the Industry

Owing to the fact that an extremely plentiful supply of suitable water is required in this industry, the subject of pH control in connection with water purification and water softening is of definite interest. The power plant operator finds a great deal of use for pH measurements in the elimination of boiler corrosion. This is not the sole means of preventing damage to the metallic surfaces of the steam system, but is used advantageously in conjunction with the control of concentrations of various salts which are of a corrosive and scale-forming nature. Other tests such as sulphates, chlorides, phosphates, together with dissolved oxygen, hardness, alkalinity are used in this connection. Wherever the water is to be passed through a softening operation, pH control will be found to be invaluable.

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◆ Executive Changes at Hammermill

Three advancements were announced by the board of directors of the Hammermill Paper Company, Erie, Pa., on February 7.

Harrison R. Baldwin was elected a vice-president of the company, continuing as manager of sales.

Donald S. Leslie, assistant manager of sales, was promoted to be assistant general manager. Mr. Leslie will continue active participation in sales work.

A. Ellis Frampton, advertising manager, retains that title, and was given additional duties as the new assistant manager of sales.

In addition to their departmental responsibilities, Mr. Leslie and Mr. Frampton hold elective offices in the company organization as assistant treasurer and assistant secretary, respectively.

◆ Engineering Week of Interest to Paper Mill Men

Plans for a huge conference of engineers at Chicago, during Engineering Week, June 25 to 30, sponsored by the Century of Progress Exposition, are making excellent progress. Engineers and superintendents of paper mills will be particularly interested in the sessions of the American Society of Mechanical Engineers, the American Society of Heating and Ventilating Engineers and the American Institute of Electrical Engineers. Some twenty of the national engineering societies will also participate with sectional and national meetings.

In addition to the many interesting educational exhibits at the Century of Progress Exposition, engineers of the paper industry will also see much of value at the Sixth Midwest Engineering and Power Exposition, to be held at the Coliseum during the week. At this exposition some 300 manufacturers will show the latest developments in steam generating equipment for power and process purposes. In addition, there will be a wide range of equipment such as ventilating and air conditioning equipment, pumps, water softeners, electrical apparatus, etc.

The combined membership of the engineering groups participating in Engineering Week is 91,600. Preliminary estimates of attendance indicate the largest gathering of engineers in history.

◆ Goodrich Appoints Distributor for Cutless Rubber Bearings

To insure more concentrated and specialized sales and engineering service to dealers and users, The B. F. Goodrich Rubber Company, Akron, Ohio, has appointed Lucien Q. Moffitt, Inc., exclusive distributors for Goodrich Cutless Rubber bearings in the United States and Canada.

Lucien Q. Moffitt, who has been manager of the Cutless Rubber bearing department of Goodrich since this new development in water lubricated bearings was first placed on the market several years ago, heads the new distributor company. With him are associated the same engineering and sales personnel which has handled Cutless Rubber bearings in the Goodrich offices. Offices of the new distributors are in the Peoples Bank building, Akron, Ohio.

◆ THE JOINT COMMITTEE on Approved Pulp Testing Chemists announces the approval of the following as pulp testing chemists: Ragnar Monnberg, of Abitibi Power & Paper Co., Ltd., Smooth Rock Falls, Ontario, Can., Elmer S. Hinman, Spring Grove, Pa., and Enrique Touceda, Albany, N. Y.

Annual Meeting of the Parent Association

Pressing problems discussed by paper manufacturers in reports and addresses at Fifty-sixth Annual Convention.

AT THE annual meeting of the American Paper and Pulp Association which convened Thursday morning, February 16, President Sidney L. Willson took the chair and opened the meeting with the president's annual address in which he reviewed the events of the year and touched on problems confronting the industry. As president of the association for the past four years, he had been brought face to face with many new and difficult problems and there are other changes ahead of the association which might necessitate a change in its organization structure. Anticipating this, he had recommended the appointment of a committee to consider the subject.

President's Annual Address

One of the pressing problems before the association was how to keep it alive with the constant falling off in membership due to adverse economic conditions. Notwithstanding a greatly decreased income, a deficit had been wiped out through self sacrifice and efficient management, the credit of which reflected, he said, upon Secretary Charles W. Boyce and his office staff. There had been radical cuts in salary and a suspension of certain activities which would not lower the standard of value and usefulness of the association to the industry.

The downward trend of paper prices received attention. The price index based upon 1926 as 100, dropped from an average of 73.0 in 1931 to 63 in January, 1933, and there was no indication that the decline was at an end.

Depreciated currency equalization has influenced the decline in prices in the United States and this depressing influence can be eliminated through legislation without setting up an abnormal competitive situation.

Pulp prices throughout the world are controlled by Norway, Sweden and Finland. Mr. Willson said that their shipments to the United States have formed a greater proportion of our pulp consumption than ever before and their shipments to European consuming countries were proportionately high upon the same basis. He thought that these countries might do well to make sacrifices in their volume of shipments rather than try to break American prices which would mean sacrificing their opportunity to increased prices in other markets which normally take a larger part of their shipment.

Relations with labor were touched upon in President Willson's address. A general reduction in wages has been effected, not by violent action, but by a process of reasoning. There still remains some problems affecting labor—problems of socialistic legislation—and of capitalism to face in the future.

Tariff protection is a question likely to be discussed in the next congress and support for the Tariff Committee of the association was urged on the part of firms in membership.

President Willson closed his address by calling attention to a chart issued by L. C. Reynolds, controller of the American Writing Paper Company, which pointed out some remarkable similarities in the course of business following the Civil War in the United States and the World War. He said:

"The Civil War, according to Mr. Reynolds, brought about conditions affecting commodity prices and business volume which in the World War were repeated. Both wars lasted for approximately four years and brought about an inflation of commodity prices to about the same level. In each instance also, the deflation curve of average commodity prices crossed the normal line thirteen years after the war.

"Two depressions followed in the wake of both wars. The first a minor depression as in 1921 and the second occurring exactly nine years after the peak prices occasioned by the wars.

Sidney L. Willson
Reelected President of the Association

"The fact that this depression has apparently plunged downward further than that of 1873 may be more apparent than real. He points out that today we are essentially industrial whereas in 1873 we were essentially agricultural, and our standard of living today includes more non-essentials, thereby bringing about greater fluctuation in business volume.

"The question is, whether this depression will cease at the end of six years as did that of 1873.

"Our curve of business descent was arrested last June and has since showed a tendency to resist further descent, and a preparation for a return of business volume. If this is followed by an upward ascent similar to other depressions, it would come back to the normal line at the end of 1935, closing exactly a six years' period.

"If this happens the psychological effect resulting from the long ascending curve of business would carry us to greater heights of prosperity than ever before attained.

"It is obvious that the year 1933 is critical and that we can not well afford to have a crisis occur within any country and that recovery is largely tied up with the removal of restraints which the nations of the world have placed upon international commerce.

"It is equally obvious that our business cycles are somewhat like the swinging of a pendulum and that the pendulum has swung further in this depression than ever before. Regulation of industry seems to be the answer to the question as to how to keep the swings of our business pendulum from being so wide. We have always learned a lesson from national depressions and have always subsequently profited thereby. There is no reason why this depression should prove the exception."

Association Activities

The report of the secretary was then called for and Charles W. Boyce presented a brief statement of the association's activities during the year. Referring to membership and financial difficulties which had made it hard to carry on, he said the year's total income would amount to $45,149, if all dues were paid, while the activities of the association at the beginning of the year had been budgeted at $48,854. The difference be-

tween the budget and the expenditures amounted therefore to $3,705. This in itself would present no great problem in financing, but when added to the debts accumulated in the past the problem became a complicated one.

On April 1, 1932, the association owed a total of $28,082.26, of which $7,500 was for bank loans, $13,406.25 to member companies for advances made in 1929 and 1931, and a total of $7,176.01 chiefly to the Import Committee of the American paper industry in behalf of the industry's Tariff Committee of 1929 and 1930.

Mr. Boyce said that the bank loan had been reduced to $1,500 and provision had been made for the payment of this amount. Member loans had been reduced to $2,631 chiefly by cancellation on the part of the companies, and the amount owing the Import Committee on the tariff account is now the subject of negotiations. He said that the rapid reduction of the association's indebtedness had been deliberately programmed and rigorously followed. There had been necessarily a restriction of the association's activities, yet its accomplishments during the year would by no means go down in history as not the least in its annals of service. He closed his report with an enumeration of some new activities of the association which had proved of great service to the industry. In 1932, as perhaps in no other recent year, the association had succeeded in establishing close contact with the grade and group organizations in the industry.

Relations Between Manufacturers and Merchants

An address of extraordinary interest on "Co-operation Between Mills and Merchants" was made by W. J. Raybold, president of the Rising Paper Company, and a former president of the association. He began by the use of a Scriptural quotation to the effect that no nation could live to itself alone, though one nation might seem to have the advantage. He followed it with another quotation which he credited to the late Calvin Coolidge: "We are all in the same boat and must come ashore together." He made this the text for what was to follow, saying that our industry cannot be prosperous—the manufacturer cannot be prosperous if the merchant does not prosper. The same is true of all business. The paper business cannot long be good with the steel and automobile business bad. These facts are obvious, but it is useful to re-state them if only to remind ourselves of the great change that has come about in the paper industry during our lifetime.

Mr. Raybold indulged at some length in observations concerning the proper relations to be maintained between manufacturers and merchants. The costs of distribution are being objected to and this feeling must be reckoned with and a solution of the problem found. The domination of the market by standard grades and qualities is beginning to be felt and the tendency should be fostered, since it is in the interest of both manufacturers and merchants. He advocated a new resale price which should recompense the merchant for the expense of carrying on business. He favored a return to the cent per pound mark-up in place of the present percentage mark-up.

Mr. Raybold expressed gratification at the spirit of co-operation which has prevailed among members of the organized manufacturers and merchants and said that, with this spirit prevailing, all problems which now seem so serious can be dealt with successfully and settled on the right basis.

Depression Deepened by Bank Liquidations

Mr. Raybold was followed by Newton D. Alling, a banker, who was listed on the program for a discussion of "Share-the-Work-Movement." He pointed to what he said was the real cause of our experiencing so deep a depression, as bank liquidations, both banks closed and banks remaining open. There has been a reduction of total deposits amounting to between fourteen and fifteen billion dollars. The cure will be found in a more stringent regulation of loans and a guaranty of deposits.

Imports from Countries with Depreciated Currency

Sheldon Wardwell, who, besides being a director of the St. Croix Paper Company, is attorney for the Great Northern Paper Company and the Champion International Company and is therefore qualified to speak for most of the mills in the American newsprint industry, spoke of the injury to domestic production which had been caused by imports from countries with depreciated currency. They had led to price reductions and had brought about unemployment.

Reference was made by him to the injurious effect of the Canadian reciprocity act of 1912 which had deprived the United States of tariff protection and fostered the growth of Canadian newsprint mills. Now the American newsprint manufacturer is forced to compete with foreign mills having low-wage scales, government subsidies and depreciated currency. This type of competition had to be met if the American mills were to stay in business. He said there was no economic reason why newsprint paper manufacturers should not have tariff protection.

Aid Solicited for Century of Progress Exhibit

Phil A. Howard made another of his earnest appeals for the support of the industry in the staging of a comprehensive exhibit of paper manufacturing processes and products at A Century of Progress Exposition in Chicago next June. He urged the association to do something collectively as it was unthinkable that the great American paper industry which stood seventh in the list of American basic industries should not co-operate with other industries and provide a comprehensive exhibit or at least supply the funds to promote the success of the Paper Section at the exposition. An effort is being made to raise a fund of $75,000 which is less than that being subscribed by other basic industries.

President Willson endorsed Mr. Howard's plea for support and urged the members to give him every aid in developing his plans.

Tariff a Question Mark Surrounded by Fog

The Tariff situation was the subject of a talk by Arthur Faubel, of the American Tariff League. He characterized the tariff today as a question mark surrounded by fog.

Officers Elected

Following this, the Committee on Nominations made its report through Harrison R. Baldwin, chairman, and the following officers were elected unanimously:

President, Sidney L. Willson, American Writing Paper Co., Inc.; vice-President, W. L. Carter, Nashua Gummed and Coated Paper Co.; vice-president, D. K. Brown, Neenah Paper Co.

Executive Committee — Henry B. Schmidt, Schmidt & Ault Paper Co.; Norman W. Wilson, Hammermill Paper Co.; D. Clark Everest, Marathon Paper Mills Co.; Merrill B. King, Rex Paper Co.; J. N. Harvey, Southern Advance Bag & Paper Co., Inc.; John L. Riegel, Riegel Paper Corp.

After moving adoption of the report and the election of the nominees by an affirmative vote, the committee expressed its gratitude to Mr. Willson for having consented to serve another term of office. Mr. Willson acknowledged this by saying that he was glad to serve as president and do something for the industry.

Before adjourning the morning sitting, Secretary Boyce read a memorial tribute for twenty-four members who had died during the year and the memorial resolution was adopted by a rising vote.

Luncheon Meeting

At the luncheon meeting in the afternoon, Mr. Willson, who presided, introduced two guests: Harold Crabtree, of the Howard Smith Paper Mills, Ltd., Quebec, who is president of the Canadian Pulp and Paper Association, and Sidney L. Wellhouse, of the John W. Leslie Paper Company, Minneapolis, the new president of the National Paper Trade Association.

President Willson on World Affairs

President Willson addressed the members at some length on the condition of world affairs and said the time had come for a new conception of our duties and obligations, and for a re-appraisal of our responsibilities. Speaking of the position of the paper industry he said:

"We are the stewards of a vast economic empire whose lands and equipment within the borders of this country can now produce annually fourteen million tons of paper and seven million tons of pulp. The mills and machinery alone represent a capital investment of

about $2,165,000,000. The owners are a vast army of security holders who, with the employees, the suppliers of material, the transportation systems and the tax gatherers, depend directly on us for all or part of their livelihood. The users of our products include every man, woman, and child in this country and many abroad. We are decidedly an essential industry and hold a responsible place in the social and economic fabric of a complex civilization."

The evil of cutting prices was touched upon. "Assume a time when the paper mills are running at normal capacity and the price level is stable. One unit lowers quotations, and if as a result the average price level on all papers falls but thirty-one cents per 100 lbs., it means a loss to the industry of $98,000,000 a year, or just exactly 6 per cent on the entire plant investment of $1,632,000,000. Under similar circumstances, a drop of twenty-two cents a 100 lbs. on pulp, wipes out $32,000,000 a year, or 6 per cent interest on the $533,000,000 capital used in the pulp industry. At present operating levels, similar price changes bring even more disastrous results."

Mr. Willson said he did not advocate price fixing but he did urge careful consideration on all factors involved in pricing with emphasis placed on the actual costs.

Assistant Secretary of Commerce Speaks

The principal speaker at the luncheon was Dr. Julius Klein, assistant secretary of the United States Department of Commerce. An accomplished orator, Doctor Klein got the attention of his hearers from the start with an apt story bearing on the coming changes in personnel in the government bureaus at Washington. First, however, he presented the greetings of the Department of Commerce, which valued its relations with the American Paper and Pulp Association, one of the oldest trade associations in the country.

He said that the officeholders in Washington suffered from no illusion as to the temporary character of their jobs. Not like the Queen of the Belgians who, on an inspection tour of Johns Hopkins Hospital during her recent visit to this country, expressed a wish to pay her respects to Dr. Adolph Meyer, perhaps the greatest psychiatrist and nerve specialist in the world. Newton D. Baker escorted Her Majesty to an office at the end of the hall where the great man was seated at a desk scribbling in his books and apparently oblivious of his surroundings. He presented the royal party. The Queen said, "This is just a little informal meeting," and saluting the distinguished scientist added, "I bring you the greetings of my people who have venerated your name and profited by your great studies in nervous disorders. I am the Queen of the Belgians. My countrymen venerate your memory."

The old fellow lowered his glasses, peered at Her Majesty a little sharply, and, turning to Mr. Baker, said: "How long has this lady been laboring under these delusions."

Illusions and Delusions—This provided an opportunity for Doctor Klein to touch on some of the illusions and delusions that afflicted some members of the paper industry. Recently he had talked with a paper manufacturer who was lamenting the fact that 44 per cent of the capacity of the mill was idle. Doctor Klein ventured to ask how much of that 44 per cent deserved to be busy, and here, said he, lay a great problem. We are so accustomed to thinking in capacity, visualizing the status of an industry in terms of its capacity—or the idleness of its capacity—that we fail to appreciate the rather crucial question as to how much of that idle capacity really should be idle outside of the mill or junk heap rather than inside and under maintenance.

Machinery Ten Years Old Should Be Scrapped

There is need, the speaker said, for a courageous study of the problem which was one involving the scrapping of obsolescent material, for 44 per cent of the machinery in operation in this country was ten years old or more. Now, Doctor Klein continued, the world has not stood still in those ten years and neither has the technology of manufacture stood still. Depression may involve a cessation of productive activities, but not in all fields. In the field of engineering it has had an enormously stimulating effect on the inventive genius of engineers. They have not been so much occupied with production problems, concerning themselves mainly with the advance of methods of production and technique. Last year in the Patent Office of the Department of Commerce there were granted no less than 59,000 patents, the largest number ever granted in any one year in the whole history of that organization founded by George Washington.

Urges a Rigid Scrutiny of Equipment—Doctor Klein put this as his text for a sermon in which he urged the most rigid scrutiny of equipment, a most careful and ruthless canvass of the installations in every mill to see whether they were up to the latest in technique, because many a firm that is watchful in that regard has resolutely turned its back on much of its share of the 44 per cent idle stuff. The executives of such a mill have regarded their machinery and said: "That is out of date; we cannot go forward shackled to some archaic equipment. When the time comes we are going to move with the fastest ones, the newest ideas."

Elaborating on his theme, Doctor Klein said: "Technology has advanced. It continues to advance, and any manufacturer who sits back snugly and says, 'I know all the ways there are to make a certain type of noiseless alarm clock or musical fly paper. You cannot tell me anything about this industry, because there are so many ways of doing this and you cannot make a silk purse out of a sow's ear; I know this right down to the ground.'"

Doctor Klein then proceeded to tell how a silk purse was actually made out of a sow's ear by a chemical engineer friend of his, and the product having been exhibited at one of the Chemical Expositions held in New York. Many in his audience were able to recall this feat of Dr. Arthur D. Little, of Cambridge, Mass., in thus defying an old and time-worn saying.

A Tribute to Trade Associations

In the course of a lengthy address the speaker paid a tribute to the value of trade association movements which he said represented one of the greatest gains to the country. During the present depressed condition of business much of our tranquility in the face of adversity could be credited to the growth of the trade association movement.

This brought the proceedings of the annual meeting to a close.

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◆ National Paper Trade Association Meeting

The annual meetings of the various divisions of the National Paper Trade Association were held simultaneously with the A. P. & P. A. and T. A. P. P. I. at the Pennsylvania Hotel, New York, on Wednesday, February 15, except that the luncheon meeting and election of officers took place a day earlier. A number of manufacturers attended the luncheon and Secretary Charles W. Boyce had a seat at the speakers' table. The principal address was made by Congressman Carroll L. Beedy, representative from the State of Maine, who denounced the prevailing competition from depreciated currency countries.

At a business meeting preceding the luncheon, Retiring-President F. J. Miller delivered his annual address and reports were presented by the Board of Directors and Executive Secretary A. H. Laughlin. The meeting was addressed by R. W. Belcher, representing the Chamber of Commerce of the United States, and Benjamin A. Javits, of Javits & Javits, New York, on economic subjects.

The annual election for officers to serve during the ensuing year resulted in the choice of the following:

President—Sidney L. Wellhouse, president, National Paper Company, Atlanta.

Vice-president, in charge of Fine Paper Division—A. W. Leslie, vice-president and general manager, John Leslie Paper Company, Minneapolis.

Vice-president, in charge of Wrapping Paper Division—Harold L. Zellerbach, president, Zellerbach Paper Company, San Francisco.

Treasurer — Charles Addoms, vice-president, Miller & Wright Paper Company, New York.

The guest speaker at the annual meeting of the paper merchants was Prof. Paul H. Nystrom, Columbia University School of Business, who discussed in a most instructive and entertaining manner "the distribution outlook."

T. A. P. P. I. Meeting Featured by Diversified Subjects

Eighteenth annual convention well attended. Lively program referred to as "A Four-day Circus with Three Rings"

CONTRARY to expectations based on the present condition of business, there was a gratifyingly large attendance of paper manufacturers, paper merchants, and technical men connected with the industry at the series of meetings held at the Pennsylvania Hotel, New York, during the week of February 13. The Technical Association of the Pulp and Paper Industry, with seven divisions holding meetings simultaneously, carried off the honors in point of attendance and interest taken in the proceedings. As described by Vice-President Clark C. Heritage, with the papers grouped in the symposia, it was a four-day circus with three rings going at the same time. In addition to this, there were numerous committee meetings composed of members of the various divisions so that it was difficult to keep track of the proceedings. Thus under Management Division, of which W. R. Maull is general chairman, five committees functioned. These comprised committees on Education, History and Biography, Management Methods, Patents and Waste. The Engineering Division headed by E. F. Bearce comprised committees on Equipment, Heat and Power, and Materials of Construction. The Raw Materials Division, of which Dr. John L. Parsons is general chairman, has two main committees, Fibrous Raw Materials and Non-Fibrous Raw Materials, as well as a sub-committee of Chemical Pulp Specifications. The division having the largest number of committees was the Operating Division, of which Fred C. Clark is general chairman, these comprising: Preparation of Fibrous Materials, Preparation of Non-Fibrous Materials, Mechanical Pulping, Acid Pulping, Alkaline Pulping, Stuff Preparation, Paper Manufacture and Finishing.

Four committees took part in the work of the Converting and Consuming Division, A. W. Nickerson, chairman, as follows: Coating, Laminating, Container and Graphic Art.

The Testing Division, of which E. O. Reed is general chairman, comprised three main committees: Fibrous Materials Testing, Pulp Testing, and Paper Testing, and a series of sub-committees, including Resistance to Printing Inks, Chemical Methods, Grease Resistance, Water Resistance, Microscopy, and Physical Testing.

There was a Research and Development Division headed by C. E. Curran, with four committees functioning, as Abstracts and Bibliography, Fundamental Research, Paper Use Requirements, and Permanence and Durability.

In addition to the foregoing, were a number of miscellaneous committees such as the Joint Textbook Committee, Joint Educational Committee and Chicago Century of Progress Committee.

General Session

A general session of T. A. P. P. I. was opened by President Allen Abrams shortly after half-past nine o'clock on Monday morning, February 13, when the four-day program was discussed by Vice-President Heritage, who invited the various divisional chairmen to meet with him in Room 1151 at noon. Following this announcement, the general meeting broke up to permit members to attend division meetings, as well as a joint meeting of the Pulpwood Department of the American Paper and Pulp Association and the T. A. P. P. I. Raw Materials Division.

Pulpwood Holdings as Mill Assets

George N. Ostrander, of Finch, Pruyn & Co., presided at the joint meeting at which papers were read and discussed by himself, John Traquair and H. R. Murdock. An afternoon session of the joint committee was featured by papers on "Variations in Yield and Quality of Sulphite Pulp Made of Spruce from Different Regions," by Bjarne Johnsen and C. H. Reese, Mr. Reese reading the paper. Alexander Koroleff, of the Woodland Section, Canadian Pulp and Paper Association, gave a paper on "Modernizing Pulp Wood Operations," in which he contrasted past and present methods of logging work. "Transportation and Mill Handling of Pulp Wood" gave an account of the International Paper Company's methods of handling pulpwood and the operation of bark burning boilers besides cable conveyors, stackers and pulpwood grabs.

Emphasis was placed by Mr. Ostrander in his opening remarks on the value of pulpwood holdings as mill assets, his conclusion being that wood stands owned by the company produced better paper at lower cost than purchased wood. However, the cost of timber ownership had greatly increased of late years, and if these costs were added to the original purchase price, forest holdings might become too expensive to use. He remarked that some mills were providing for pulpwood in perpetuity, particularly those situated in new pulpwood regions and this meant extensive reforestation programs. Some companies take no thought of the future in the belief that existing supplies of pulpwood are inexhaustible, which he regarded as a mistake and might lead to conditions that had been experienced years ago in New York State when an apparently inexhaustible supply vanished with concentrated demand.

Uses for Agricultural Waste

In the report of the Fibrous Raw Materials Committee, submitted by John Traquair, mention was made of the millions of tons of fibrous agricultural waste which would ultimately become a principal source of future cellulose supply. In the course of his talk, he commented on the decline in the consumption and value of such raw materials as rags, waste papers, straw, flax and rope. Insisting that the supply of spruce wood for sulphite pulp would not meet the demand, he urged a reconsideration of straw as a papermaking material. He was led to urge this in view of the great increase in chlorine production, chlorine having been employed economically and effectively as a pulping agent. Although at present day prices wood has the edge on straw, it should be remembered that straw is an annual crop while wood takes thirty years to mature. The story as he told it was not very hopeful for straw when storage and transportation costs were considered. However, the chemists had not said the last word on straw, he remarked.

Mr. Traquair made some interesting references to the progress of work in the deinking of paper and described some new and old processes.

He referred in complimentary terms to the new Waste Paper Code which had been adopted by the Waste Paper Association, and, after noting that the use of pulpwood other than spruce was on the increase, he made a reference to Prof. H. K. Bentzen's Report on Wood Utilization, saying it was an outstanding contribution to our knowledge of the chemical utilization of wood.

In discussing the subject, J. N. Stephenson touched on Mr. Traquair's comparison of bleached sulphite pulp with straw pulp, not all sulphite pulp in use being bleached. Another thing that struck him was that he spoke as a papermaker and not as a chemist, which he was well qualified to do.

Possibilities of the Whole Cotton Plant

H. R. Murdock, director of research, the Champion Fibre Company, Canton,

N. C., presented a paper "The Cameron-Dockery Proposal for Utilization of the Whole Cotton Plant as a Source of Cellulose for Papermaking." It was the idea of Prof. Frank K. Cameron and Nicholas W. Dockery, of the University of North Carolina, that a method of cotton planting and harvesting could be used that would increase the yield per acre in terms of cellulose, using the whole plant with the exception of the root and not just the boll fiber, nor merely the cotton stalk. It is proposed to sow the seed by broadcasting in the manner used in planting grain. After cultivation, the whole plant with the bolls and seeds, according to their plan, is to be baled and shipped to a mill for pulping by methods in ordinary use. According to Mr. Murdock, the results offer small encouragement relative to the cellulose in the stalks, though it is probable that a low cost, long fibre cellulose might be obtained from cotton grown and harvested by the proposed Cameron-Dockery method.

Perhaps the most largely attended of any of the division meetings was that of the Engineering Division in which a series of interesting papers were read and discussed on chromium-nickel-iron castings for sulphite pulp processes, as well as discussions on digester linings.

Physical Tests for Paper

The Testing Division met in the afternoon with B. W. Scribner, chief of Paper Section, U. S. Bureau of Standards, in the chair, when James d'A. Clark, technical director of the Scott Paper Company, Chester, Pa., discussed Physical Tests for Paper. He suggested the limitation of physical tests to sampling, conditioning, basis weight, thickness, burst, tear, tensile strength, stretch or percentage elongation, and folding. Under each heading he gave the substance of recommendations which had been made to committee members together with their opinions concerning them. The object of the committee of which he is chairman was not only to provide more suitable routine testing methods but to lay down an authoritative procedure which might serve as an international standard. Some of the methods discussed by him were unsatisfactory and more work is needed to simplify and standardize them.

Characteristics of Casein Discussed

The Converting and Consuming Division had both a forenoon and afternoon session under the chairmanship of J. J. O'Connor, technical director of the Mead Corporation. More ladies were present at the meetings of this division than were noticed at other division meetings. A round table discussion took place on the characteristics of casein. Mr. Whittier, of the United States Department of Agriculture, gave a resumé of the work done by this department which was interested in increasing and developing the market and uses for casein. The speaker brought out that the prime necessity at the moment is a standard method for evaluating casein to make sure that the paper manufacturer gets what he wants. He instanced some conclusions of the department and announced that publication of the results would be made later in the *Journal of Industrial and Engineering Chemistry*.

There was an exchange of amenities between Chairman O'Connor and H. R. Rafton at the afternoon session when Mr. Rafton presented his account of a test for opacity and whiteness for paper coating pigments. A pigment and adhesive coating of standard weight is put on a colored paper and observations made as to the extent to which a colored paper surface is obscured. The chairman asked the speaker to give his opinion of the covering properties of various pigments. Mr. Rafton said that a large variety of pigments, including titanium oxide and zinc, had been tested in his laboratory but he did not regard Mr. O'Connor's request for a list of the tests as a proper one, so he declined to give them without allowing others to have an opportunity to check the tests made. In reply to a request for details of the method used in measuring opacity, Mr. Rafton referred the inquirer to his prepared paper which was available in preprint form.

Secretary and President Make Reports

The forenoon of Tuesday, February 14, was occupied with the general meeting of the Technical Association of the Pulp and Paper Industry when the annual report of both the secretary and the president were presented, a code of ethics adopted and various divisional reports received, following which Doctor Charles H. Herty gave an account of developments in the manufacture of white paper from slash pine.

Progress of the Association

The first business taken up was the annual report of the secretary presented by R. G. Macdonald. In this, details were given of the progress of the association during the past year, referred to as "a program of internal development and improvement and extension of services to its members." The report brought out that during the year just closed, 101 new members had been elected and 204 had resigned or were dropped from membership, the total individual membership on December 31, 1932, standing at 1,093. The corporate membership was 69 and the contributing membership 34. An enumeration was given of the special reports issued during the year and of the publications issued by the association.

Reference was made to the successful operation of four sections of the association: Delaware Valley, Pacific, Lake States and Kalamazoo Valley. An organization to be known as the New England Section has been formed in Holyoke, Mass. Various changes in the personnel of divisions and committees were noted and acknowledgment was made of the co-operation of members in advancing the interests of the association during the year.

President's Address

Following the report of the secretary, President Allen Abrams delivered his annual address in which he made acknowledgment of the earnest work of the Executive Committee and the Secretary-Treasurer by which the association had passed successfully through a trying year and was in a strong position financially and also with respect to membership. He made mention of the able assistance of Vice-President Clark C. Heritage, who was responsible for much of the committee activity.

Referring to the publications of the association, he noted the appearance of the T. A. P. P. I. Year Book and commented on a forthcoming publication of even greater importance, *T. A. P. P. I. Standards*, which will contain the accepted methods of testing, approved practices, and specifications of the association, in looseleaf form. He reviewed the development of T. A. P. P. I. sections or branches. He said it had been the policy of the association to allow groups of members to solicit a charter rather than for the association to seek new sections.

In a summary of facts relating to technical progress, President Abrams discussed Technocracy, a subject which, he said, had been brought into disrepute through premature publicity and overzealous press agents. He thought there should be a better balance and closer harmony between technical progress and social and economic advancement.

Quoting from H. H. Dow, who divided the technical age into three periods, it was represented that the steam engine ushered in the use of power; and that interchangeable parts then made possible mass production. According to Mr. Dow, the third period would be based upon the use of automatic control in producing automatic operation, and President Abrams said that the increased employment of the robot, the photo-electric cell, the thermostat and similar inventions would seem to bear out Mr. Dow's prediction.

President Abrams said he was thoroughly convinced that the country would emerge safely from the present depression. T. A. P. P. I. had definite responsibilities ahead and to these every thought and energy should be devoted.

He advocated the exchange of information which was not confidential and which could be used to benefit the industry as a whole. The competition of tomorrow will be increasingly between industries, and the one which has best working co-operation within its ranks is the one which will come out on top.

Exhibit at A Century of Progress

After appointing a Nominating Committee, composed of R. S. Hatch, G. E. Williamson, and F. C. Clark, who were instructed to report at the luncheon meeting on Thursday, Phil. A. Howard, president of The Paper Foundation of Chicago, was introduced and made a strong plea for the support of paper manufacturers and of men in merchan-

dising channels in the work of underwriting a comprehensive exhibit of paper and paper products at A Century of Progress Exposition in Chicago this summer. A good location for such an exhibit has been set aside in the main exhibit hall. It is hoped to raise a fund of $75,000 to finance the exhibit through the activities of the Paper Foundation, which has the leasing of space to paper manufacturers at a rate of $400 a unit. The paper industry, through The Paper Foundation, has been late in coming into the picture, Mr. Howard said, and it is necessary to work fast. It is proposed to make an impressive exhibit of papermaking processes and products and he said the members of the Technical Association are being counted on to aid The Paper Foundation in the creation of a fitting paper exposition, one which will be calculated to bring the industry out of its present stagnation.

Division Chairmen Report

Divisional chairmen were invited to make reports bearing on their activities during the year and their programs for the annual meeting and a number of responses were made which gave indication of great activity. President Abrams announced that the fall meeting next year would take place somewhere on the Pacific Coast.

J. N. Stephenson, of Montreal, reported for the Textbook Committee, giving details of finances and sales. A certain discrepancy was noted beteen the sales of Vols. III, IV, and V. Thus, while 6,458 copies of Vol. III have been disposed of, only 5,322 copies of Vol. IV have been sold and the number of copies of Vol V that have been disposed of is still fewer, amounting to 4,331. It was suggested that communications be sent to purchasers of Vol. III urging them to invest in copies of Vols. IV and V.

Southern Development in Papermaking

The feature of the morning sitting was an illustrated paper by Dr. Charles H. Herty on the utilization of slash pine as a papermaking material. Doctor Herty is the director of the Division of Pulp and Paper Research of the Georgia Forestry Department, and is operating a fully equipped mill at Savannah for research work in the commercial utilization of slash pine for paper pulp. He illustrated the experimental plant at Savannah by means of lantern slides and described the equipment, which includes a Pusey and Jones fourdrinier machine trimming 26 inches. Most of the experimental work has been confined to the replacement of spruce pulp by slash pine pulp in the manufacture of newsprint paper, but other developments looking to the availability of slash pine pulp in the manufacture of other grades of white paper are in progress.

Doctor Herty recounted that ever since 1913 he has been working to secure the independence of the United States in chemical matters and the one great gap left was cellulose. It is his hope and expectation that through the great open spaces of the South there will yet be built up an export business in pulp and paper. At present, the experimental work is confined to sap wood, heart wood being of no use. He spoke of slash pine as the great tree of the South which grows with great rapidity. The average diameter of the wood used is six inches and the age of the trees at cutting ranges from ten to fifteen years, which is in striking contrast with the cutting age of spruce at fifty years. He favored the use of green wood, never having had any trouble from pitch when using fresh wood. He spoke of trouble that had been experienced through the development of a blue stain on sap wood and said it has been ascertained that if slash pine were left with the bark on for three months after cutting no trouble from blue stain would arise. The wood is best when ten to fifteen years of age and having a diameter of 10 inches. Details were given of cooking time, pressure and temperature. Either dolomite or high calcium lime could be used to give a 43 to 45 per cent yield. He admitted that efforts to produce a pine sulphite pulp equal in initial strength to spruce fiber had not been successful. He noted a difference between spring wood and summer wood. Wood cut in the spring had thin-walled cells, much more delicate than the thicker cell walls of winter cut wood. He said there was no special advantage to be gained in cooking with a soda base.

Invitation from Savannah

Doctor Herty said that President Abrams had received an invitation from the Georgia Forestry Association for members of T. A. P. P. I. to attend the annual meeting in Savannah. The meeting was intended originally to be held at Savannah on May 12, but in order to suit the convenience of many members of the paper industry the date had been advanced to May 1. Through the cooperation of the Savannah Chamber of Commerce and the Ocean Steamship Company a boat will leave New York on Friday afternoon, April 28, and the round trip to Savannah would cost only $25. Doctor Herty extended a hearty invitation to all present to visit Savannah on May 1. The invitation was extended, he said, on behalf of the citizens of Savannah and the Savannah Chamber of Commerce.

Pulp Insulated Wire

Adjournment of the general session followed the presentation of a paper by J. S. Little, of the Western Electric Company, on "The Manufacture of Pulp Insulated Wire." According to this, a process of applying paper pulp directly to small gauge electrical conductors has been developed. A narrow ribbon of pulp with a wire imbedded in it is made on a machine of the cylinder type. The ribbon is rolled around the wire while wet and after drying forms a continuous electrical insulation for the conductor. Such wire is used in telephone exchange area cable but it is expected in the future that the use of both product and process will be further extended.

Other Meetings

In the afternoon meetings were held of the Management, Engineering, Research and Testing Divisions. Vocational education was the subject discussed in the Management Division under the chairmanship of W. R. Mauil and H. G. Noyes. The papers listed included one by C. E. Libby on "Training Requirements because of Technological Changes in the Industry." Another by J. R. Crowley on "State Participation in a Training Program for the Pulp and Paper Industry," and "The Value of Job Analysis in Arranging an Educational Program for the Industry" by N. B. Giles. The chairman, H. G. Noyes, reported for the Education Committee.

White Water Eccentricities

A joint meeting of the Engineering and Operating Divisions was opened by Fred C. Clark at ten o'clock on Wednesday morning at which C. M. Baker, engineer of the American Paper and Pulp Association, gave a synopsis of a paper on "White Water Eccentricities." Emphasis was placed on the necessity for having the wholehearted co-operation of paper mill employees and suggestions made as to the procedure the mill management should follow to get this co-operation and to benefit by white water utilization in the paper mill. Detailed descriptions were given of methods employed in a collection, recirculation and reuse of white water in the place of fresh water throughout a mill. Mr. Baker said that time was required to develop successfully any system of white water utilization; a year or more often being necessary to overcome all difficulties and complete all adjustments. The savings amounted to $50 or $100 daily with a capital expenditure of $8,000 or $10,000.

Paper Drying

A. E. Montgomery's paper on "Drying Rate for Kraft Paper" was abstracted by Professor Adams of the M. I. T., in his absence. The conclusions of the author were that the rate of drying on a paper machine is best expressed in pounds of water evaporated per hour per square foot of drying surface. The drying surface was understood to include only that of trim width as well as felt dryers. It was noted that freeness and basis weight of sheet had little or no effect upon drying weight expressed in terms of paper dried, though the drying rate expressed in terms of water evaporated diminishes with increased weight of sheet. One of the conclusions stated was that drying rates for kraft paper varied widely, that of the best practice being twice that of the poorest practice at the same steam pressure.

The paper was discussed by Joseph H. Slater, who inquired if any consideration had been given to methods of removing water vapor arising from evaporation.

New Fourdrinier Shake

Much interest was taken in the announcement of a paper by Frank M. McDonnell on the McDonnell Fourdri-

nier. A description of the fourdrinier and the peculiarities of its shake were given by Chairman Clark as based on notes supplied by the inventor. Some disappointment was expressed on account of the absence of drawings or photographs of the machine.

Rubbers Resistant to Corrugation

William C. Greene, of Stowe-Woodward, Inc., was invited to present his paper on "Rubber Covered Rolls," which he did, speaking extemporaneously and without notes, in extremely interesting fashion. He began with a reference to the efforts of paper manufacturers to cater to the needs of the printer, saying that a matter of great concern to almost everyone today is the printer. How rolls may assist in providing a satisfactory sheet for the printer was explained. He said it is well known that a brass roll takes a firm hold of the sheet pulling away many of the fibers and standing a lot more on end. There is no way of replacing such displaced fibers and the detriment to finish is well known. A granite roll was an improvement, but a greater improvement is in the use of a Stonite covering applied to an iron body in conjunction with any rubber-covered roll. The easy release of the sheet by a Stonite roll leaves the surface almost undisturbed and obviates breaks on the first press, which is of great importance in connection with a weak sheet such as high bulk book papers. The weight of the roll can be varied to suit the requirements, something which cannot be done with a granite roll.

Mr. Greene said the smoothing roll bears a name which is ill applied, seeing that its function is that of leveling the sheet; its position ahead of the dryers is one of convenience and it will work better if permitted to follow a number of dryers.

Many have wondered why a Yankee machine should apparently be so effective and some thought has been given to the use of rolls placed against the ordinary dryers in order to increase their efficiency. A patent was taken out years ago on this idea. It was only of late that a floating blade doctor had been developed to keep dryers clean and with an abrasive blade actually to polish the surface. Today rubber can be made more heat resistant and freer of any tendency for the development of a surface skin.

In speaking of rubber rolls against the dryers it was understood that the roll ran directly against the sheet, the dryer felt being passed at that point.

Mr. Greene said it is easier to apply rolls to the top dryers and so the improvements have tended to show on the wire side by the removal of wire marks, and in the case of a number of rolls for the sheet to acquire a slight M. G. finish. Such rolls have a tendency to limit slip and resulting cockling. It might require time to determine just how many rolls in a given instance would secure increasingly good results, or when a diminishing return would limit their usefulness. He said he could recall within his own experience the work devoted in 1921 to rubber-covered couch rolls. At that time they were well known, but used only here and there. With more careful application, they soon became standard and he ventured the opinion, based on various installations, that the use of rubber rolls against dryers would prove increasingly helpful in meeting the present-day demands of the printer as to finish.

There were some nine papers in all listed for presentation in the symposium on paper manufacture arranged by the Operating Division and the meeting was one of the most interesting of the large number held that afternoon.

Water Removal on the Machine

G. D. Bearce made an important contribution to the afternoon's discussion with his paper on "Water Removal Factors on the Newsprint Paper Machine." He said that one of the most important factors in the efficient operation of a high-speed news machine is the handling of the stock on the wet end from head box to dryers. He regarded the construction of headboxes and slices as of great importance but only casual reference was made to it in the paper, the major problem being the handling of the sheet through the press section, resultant removal of water and the effect on the steam consumption per ton of paper. He gave credit to E. A. Rees, of F. C. Huyck & Sons, for valuable scientific work connected with the operation of felts on the wet end of the machine. Tabulations were given of the moisture content of stock in different positions on the paper machine. The figures were based on a paper machine with a 228-inch wire operating at a speed of 1,200 ft. a minute and capable of producing an average of 150 tons of paper a day. A sheet having a moisture content of 86 per cent entering the first press, and 70 per cent entering the dryers, gives up 16 per cent water or 97 gallons (808 lb.) a minute, which left 83 gallons (691 lb.) a minute to be evaporated in the dryers.

The figures cited by him demonstrated the water removal problem to be one of tremendous importance in the proper formation of a good sheet of newsprint.

Other papers read included "Modern Tactics in the War on Dirt in Paper" by F. K. Becker and "Papermaking Felts" by F. C. Ladd.

Technical Man and Practical Man

A symposium on Management Methods under the chairmanship of William M. Shoemaker was held on Wednesday afternoon, H. L. Joachim leading off with a paper on "Technical Control for Cylinder and Fourdrinier Machines." Technical control was characterized as a direct and essential part of production. A maze of problems confronts the technical men on the paper machine. The basic principle that should govern any study of the subject should include consideration of the removal of water at the wet end, its control and improvement as well as control of moisture in the finished sheet.

Discussing the question of letting the technical man or the practical man go in the present depression, the speaker said the technical man would have to be the victim. The practical man gets results and a reason for the failure of the technical man lies in his inability to place himself in the position of the workman. Our dream of technical control would come nearer when the technical man co-operates more directly with the workman.

Papermaking an Art Not a Science

James d'A. Clark, of the Scott Paper Company, gave an interesting analysis of conditions in a mill where there was conflict between the technical men and practical men. It is often the case that the technical man has a superiority complex which makes it difficult for him to work hand in hand with the practical man. Mr. Clark said he had entered the paper business fresh from college twelve or more years ago, and had been struggling ever since to discover where science could be applied in the paper industry. He was beginning to be convinced that it can't be done, as papermaking is an art and not a science.

Vance P. Edwardes said he was convinced that the handling of men is one of the greatest difficulties confronting the technical men, and Chairman Shoemaker coincided to some extent but emphasized the need of technical men to study the methods of the practical men in order to co-operate better with him.

Some of the important developments in technical control and management were touched upon by Mr. Thompson, president of Thompson & Lichtner Company, Boston, Mass., who said that where there had been no progress to speak of during the period 1890 to 1910, progress had been great in the decade of 1910 to 1920. Management progress has been highly advancing and during 1933 there is likely to be greater co-ordination of technical and operating departments, as well in the management of labor and in transportation service.

New Sulphite Circulating System

A symposium on acid pulping and heat exchanges was held on Thursday morning under the joint management of the operating and management divisions, Vance P. Edwardes in the chair. Mr. Edwardes stated that it was proposed to start a general discussion of sulphite digestion circulating systems and he called upon Herman S. Kiaer to explain the Morterud circulation system. The first use of a circulating pump to force liquor through a fibrous mass of wood or straw is credited to an Englishman named Newton, who was granted a patent on his invention in 1867. Einar Morterud has been active for thirty years or more in developing improvements in pulp manufacturing processes and he is well known for his system of forced circulation and indirect heating

in soda and sulphate digesters. He developed a system for forced circulation in sulphite digesters in 1906, but, owing to lack of the newer chrome-nickel-steel alloys, or other acid resisting materials, the material wore down and the apparatus had to be scrapped.

Mr. Kiaer described the new Morterud sulphite circulating system, an inside circulating system which has the advantage of low initial cost, relatively low power for pumping and long life. Morterud circulation units are now in use in many Scandinavian sulphite mills. The circulation apparatus is mounted inside the digester and takes up only about one per cent of the digester's volume.

Digester Control

Other papers read and discussed at the symposium included one by James Rogers, of J. & J. Rogers, of Ausable Forks, N. Y., relating to a digester control system in operation there. It was stated that the introduction of chrome nickel alloys made this system possible and temperature and pressure could be controlled within the sulphite digester during the cooking period.

F. M. P. Pulping

Andreas Christiansen, of the Rhinelander Paper Company, described the Fiber Making Processes method of sulphite pulping which represented one of the first forced circulation and indirect heating sulphite systems used in the United States. Among the advantages of the system, particular mention was made of the increased yield of fiber made possible by it and the ability to cook green wood.

Paulson Fuel System

The Paulson Process of evaporation and combustion of sulphite waste liquor was a subject of a comprehensive study by Herbert S. Kimball, consulting engineer, Waban, Mass. A mass of figures was used to illustrate boiler performance and heat balance, from which it was developed that 1,575 lb. of dry fuel could be recovered from a ton of pulp and the burning of this was capable of generating steam for the process of cooking in the digesters to the extent of 5,500 lb. of steam per ton of pulp.

Cooking Process for Colored Rags

C. E. Curran presided at a meeting of the Research and Development Division on Thursday morning at which a number of interesting papers were presented and discussed. Samuel Lehner, of E. I. du Pont de Nemours & Co., gave an account of the cooking of colored rags by the sodium hydrosulphite process. This cooking process, as applied to the cooking of new blue overall clippings, gave a stock of good color and high strength which was suitable for use in a 100 per cent white bond paper. The process consisted of a short, mild, alkali cook followed by a wash and successive short cooks with alkaline hydrosulphite. Mr. Lehner described mill trials which showed the operation to be satisfactory for the usual mill cooks. The work outlined in his paper was carried out as a co-operative development of the Institute of Paper Chemistry and E. I. du Pont de Nemours & Co., the institute work being directed by Prof. Harry F. Lewis and Edmund B. Taylor.

Effect of Bleach on Pulps

The deterioration of bleaching rag and sulphite pulps by calcium hypochloride solutions formed the subject of a paper which was presented by Harry F. Lewis, professor of organic chemistry, Institute of Paper Chemistry, Appleton, Wis., and E. R. Laughlin. As the result of an intensive investigation following an earlier study reported last year, the conclusion was reached that rag stocks of the type of No. 1 muslin are more resistant to the oxidizing action of a bleach solution than are purified wood pulps. The pulps used in the investigation consisted of alpha pulps and for comparison an ordinary quick-cook bleached balsam sulphite.

Luncheon and Business Meeting

The annual luncheon and business meeting of T. A. P. P. I. took place on Thursday afternoon when the members were treated to a brilliant address by Dr. Walter S. Rautenstrauch, professor of electrical and industrial engineering at Columbia University. Doctor Rautenstrauch is one of the foremost figures in the new field of technocracy and, after giving his prepared address on "Technology and Social Progress," many of those present engaged with him in a discussion of the causes and conditions leading to the present era of industrial depression.

Officers Elected

There was some delay in the presentation of the report of the Nominating Committee, which was one of the chief items on the program for the business sitting and it was late in the afternoon before the report was submitted for adoption. The officers consist of: Allen Abrams, president; Clark C. Heritage, vice president, and R. G. Macdonald, secretary-treasurer, all re-elected.

Four new members of the Executive Committee were named to succeed members whose terms expired this year. In this way, H. R. Murdock, director of the Research Department, Champion Fibre Company, Canton, N. C., was elected for a one-year term and W. R. Maull, Grellet N. Collins, Otto Kress and E. O. Reed were elected to serve three years each, or until February, 1936.

Mr. Maull is vice-president and general manager of the Dill & Collins division of the Mead Corporation, Philadelphia. Mr. Collins is employed in the Manufacturing Department of the International Paper Company, New York. Doctor Kress is well known as the Technical Director of the Institute of Paper Chemistry, Appleton, Wis., while E. O. Reed is Technical Director of Crane & Co., Dalton, Mass.

◆ Meeting of the Salesmen's Association

The Salesmen's Association of the Paper Industry met on Tuesday, February 14, and following a business conference at which Harold R. Knott, of the Eastern Manufacturing Company, was re-elected president, a vice-president in charge of the eastern division was elected, W. L. Raymond, of the New York office of the P. H. Glatfelter Company, being chosen. Douglas A. Crocker, of 370 Lexington avenue, New York, was re-elected secretary.

Plea for Paper Exhibit

At the annual luncheon in the afternoon, President Knott acted as toastmaster and introduced Phil A. Howard, president of the Paper Foundation, who made a fine sales talk in behalf of the proposed pulp and paper exhibit at A Century of Progress Exposition in Chicago next summer, following the lines of his talks before the American Paper and Pulp Association, T. A. P. P. I. and other associations that met in New York during Paper Week. It is to the credit of the Salesmen's Association that it was instrumental through the activities of one of its members, William B. Wheelwright, in starting the Paper Foundation, which was incorporated as a non-profit paying organization to assure proper representation of the pulp and paper industry at A Century of Progress Exposition, which opens in Chicago, June 1, 1933.

Entertaining Demonstration by Professors

The luncheon meeting of the Salesmen's Association was successful in an extraordinary degree, both as regards attendance and entertainment. It is perhaps a mistake to call an educational display an entertainment but Professors R. C. Borden and Alvin C. Busse, of New York University, gave a dramatic representation of the cardinal principles of salesmanship, which was both educational and entertaining.

The "Six Cardinal Principles of Salesmanship" were demonstrated. Principle one was that the salesman must do no more than his share of the talking. The temptation is to take up more than 90 per cent of the time with sales talk and not permit the prospective purchaser to air his objections. Be the world's best talker if you can but be a good talker second and a good listener first, for if you convince the prospect that you are a good listener you let him know you are square and honest and trying to render him an intelligent merchandising service.

Principle two was never to interrupt a prospect in his objections, as this aroused irritation. Principle three was never to adopt an argumentative manner or become belligerent or over positive. The remaining three principles were developed in like manner. Principle four was to inquire before you attack. When the prospect offers an objection don't at once tell him he is all

wrong, but repeat his objection and ask him if he has any other objection to offer so that you will not waste time thinking about objections which he does not happen to have. Principle five is to restate your prospect's objection in order to let him know that you understood it and your continued attempt to make a sale is with the sympathetic understanding of his point of view. Under these conditions he is willing to talk it out. Principle six to be used in the concluding part of a sales interview is to discover what the main objection may be and when discovered nail this issue to the board. Stick to it during the close of the interview and do not digress or permit your prospect to digress. Too many issues spoil a sale.

Summarizing the six principles they may be stated as follows:

1—Don't talk too much yourself.
2—Don't interrupt.
3—Don't unconsciously become argumentative.
4—Inquire before you attack.
5—Restate the important objections of your prospect.
6—In closing, concentrate on a key issue.

Package Design Is Important in Merchandising Schemes[1]

By IRMA E. MAROHN
Package Stylist
Robert Gair Company, Inc.

AFTER a product has been perfected, no matter how excellent, it is dependent, in the last analysis, upon the intervening medium, the package, to bespeak its qualities and advantages. The package must succeed in its mission as a persuasive though inaudible salesman in arresting attention and holding interest thereafter until its message reaches its mark and prompts the potential consumer to purchase. It certainly may not obscure or confuse the appeal of the contents; it must heighten that appeal. The package should be a powerful selling personality, and, in fact, should go beyond that, since a powerful selling personality can contact only comparatively few prospects or customers at best, but a well planned package can be made a powerful selling personality that contacts thousands.

Changes in the requirements of carton treatment have been enforced not only by the change from old fashioned methods of retailing but by the increased use of open display, a tremendous help to self-service in a retail situation in which the ratio of sales persons to customers has been reduced tremendously. The top and sides of the carton have become increasingly important with these developments and have added significance to the carton's third dimension because of its display on counter or floor stands. Under these conditions, the continuity of design around the package, rather than the treatment of individual panels as separate units is essential. Family tie-up between individual cartons, displays and shipping cases is of vastly greater importance in this new scheme since the several units are frequently shown together. The closer range of vision fostered by new display methods enables the designer to use refinements in designs as well as less vociferous colors than heretofore. The height of the line of vision for open counter display generally is slightly lower than when cartons were designed for shelf display.

It will be seen that these self same conditions which have resulted in more advantageous placement of the carton and display container from the point of view of visibility, also impose restrictions in construction and design. The retailer is unwilling to allow more than a minimum of his valuable counter frontage to a given product; the use of narrower displays is made necessary although length and height are not subject to the same limitations.

As in all forms of advertising, depressed business conditions have brought into use cartons which in their striving for attention violate all known optical laws—garish colors, packages crammed to the margin with text and pictorial non-essentials, lettering of a size adequate to advertise a locomotive, colors that seek to out-shout their competitors. But more recently there has been noticeable a return to the standards of good taste, good art work, beauty, suitability of lettering to the product and the merchandising scheme, avoidance of dull, stereotyped copy, all of which appeal to the good taste and intelligence of the buyer. We are returning to an appreciation of simplicity and freshness.

What Constitutes a Successful Package?

We may follow pretty generally the same standards and rules for folding boxes, display, and corrugated and fiber shipping cases, to produce a successful package.

Construction—Stability, distinction of shape, suitability of materials to the product and the packaging machinery, opportunities for advantageous lay-out and economical shipment are major considerations along with an attitude of humbleness toward consumer convenience as a definite essential in package construction. Considerations of moisture exclusion or retention in the package, and contents visibility should determine the use of such processes as waxing, asphalt interlining and the inclusion of transparent cellulose materials.

Color—Freshness is a dominant requisite as is suitability to the contents. A survey of the competitive field is essential and an effort should be made to break away from typical treatment so that distinction and uniqueness may be achieved.

The importance of color may be gathered from the results of a test recently conducted by Proctor and Gamble before determining on a new wrapper for Camay soap. I am told that 19,760 women interviewed disclosed that they react to color but apparently disregard design. Whether for masculine or feminine appeal, a pleasant balancing of color and harmonious proportioning is essential.

Design—Lettering, suitability, distinctiveness and simplicity must be considered. Cheap faddishness and superimposing copy over pictorial or varicolored background is to be avoided. The tying up of a series of cartons in a family group has immense value in its repetition of a single theme and its promotion of easy trademark identification.

Displays—There is increased appreciation of the fact that the most successful displays serve as a subordinate background for the goods. They succeed most emphatically when they guide attention toward the goods rather than attract it to themselves. Therefore, the use of neutral colors is advantageous, except in cases where the display container is intended to repeat in larger size, as in floor displays, the design of the individual carton.

The designer must in these days be pretty much of an engineer as well as an artist. The time has passed when all that was required was the drawing of a pretty picture. He must be placed in a position to do his thinking before he does his design and he cannot do this logically or effectively without having all of the available facts concerning the product and the production and merchandising plans involved.

It is necessary to consider the market and the class of customer to whom the product and the package are to appeal. Is it desired to reach a sophisticated clientele, or is it planned to reach the immigrant who can scarcely read English? Is the prospective buyer masculine or feminine? All of these questions are tremendously important and we must gauge the appeal of the package accordingly. It is necessary likewise to consider the kind of competition the package must meet and with this in view there should be time allowed in the planning of the package to study the designs under consideration in relation to rival packages.

There is evident an increasing willingness on the part of manufacturers to undertake clean cut revisions of old established packages and a growing belief that a well considered change which results in a definitely improved package, even though the revision be drastic, involves no risk. On the contrary, it may be utilized to give a fresh impetus to sales by renewing the enthusiasm of salesmen and retailers.

[1]Address delivered before the New York Advertising Club's Class in Advertising and Selling.

Paper Making—an Old and Important Industry in Japan

IN an article entitled "Chemical Process Industries in Japan" and appearing in the February, 1933, issue of *Chemical Markets*, the business magazine of chemical industry, Dr. Charles Mullin, the author, presents some very interesting facts on the subject of papermaking in this empire of the East. Most of the salient facts in his article relating to this subject are included in the following excerpt:

Growth of Industry

Paper manufacture in Japan is a very old industry. The "Nihonshoki," one of the oldest Japanese histories, A. D., 720, states that a Korean Buddhist priest came to Japan in 611 and engaged in the manufacture of paper and Indian ink. This is the traditional beginning of the industry and occurred in the reign of the Empress Suiko (593 to 628 A. D.). During this reign Prince Regent Shotoku made paper from the bark of the mulberry tree, the leaves of which were used to feed the silk worms. Cultivation of a special variety of mulberry for paper dates from this time and mulberry paper is still made on a small scale, particularly for paper threads used in weaving hats, such as the "Toya panama," clothing, etc. Very tough papers from the fibers of certain shrubs, such as mitsumata and kozo, also dates from antiquity. As a rule, native papers are practically always made in the home plants. In 1925, 30,190 of these plants manufactured native style papers with a production valued at 53,010,299 yen.

Manufacture of foreign style papers in Japan dates from about 1874 at a small mill in Tokyo. Now a number of large paper mills are owned by the Oji, Fuji, Mitsubishi, Karafuto, and Kogyo companies. Some of these plants also manufacture printing and packing papers, cardboards, etc., and, in spite of the depression, these have been able to keep up production very well, owing to the gradually increasing demand. This demand for papers in Japan and China covers a far wider field than in the western countries for the reason that paper is used instead of glass for most windows and doors, in many religious and other ceremonies, at funerals, weddings, for fireworks, etc. Some Japanese papers are exported to China, Straits Settlements, the United States, and a few other countries while a few special quality papers are imported from Sweden, Germany, the United States, etc.

The 1925 production of foreign style paper was 119,724,967 yen and the 1928 production of both native and foreign style papers was valued at 182,309,382 yen. The exports of paper in 1929 were valued at 26,288,000 yen. The leading Japanese paper manufacturers have formed a "Paper League" which controls about ninety per cent of the total output. This group produced 1,305,750,000 pounds in 1928 and 1,302,739,000 pounds in 1929.

Paper Specialties

The manufacture of paper specialties, such as card boxes, fancy packing papers, labels, paper napkins and handkerchiefs, paper "Toyo Panama" hats, clothing, etc., dates from about 1911, when the Nippon Kogyo Co. of Tokyo started production. Exclusive of the hats and clothing, the 1928 production was valued at 2,878,726 yen and the 1929 production at 2,940,226 yen. The "Toyo Panama" hats and the clothing are made from special mulberry paper and at one time the hats alone reached an annual value of about 5,000,000 yen but this has now decreased to less than 3,000,000 yen. The paper handkerchief, which very much resembles a strong and absorbent paper napkin, is almost universally used in Japan. They are very convenient and satisfactory, and could find a much wider use in other countries, especially by travelers. Copying papers are also produced in quantity in Japan.

Wood Pulp

The leading Japanese producers of wood pulp are the Karafuto Kogyo, Fuji, and Oji paper manufacturing companies. These have plants at Karafuto, Hokkaido, and in Korea. The pulp production in 1928 was 718,997 tons and in 1929, 626,622 tons, which is sufficient to meet the local demands. With the decreasing supply of suitable wood in the more convenient districts, manufacturers have found it necessary to locate mills further north. Japan is now producing a very large amount of rayon by the viscose process and this is all made from wood pulp. The rayon is mostly of third or lower grade, as compared to the American and the best European products, and at least one American producer is making a serious effort to introduce cotton linters.

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◆ Notes from an Engineer

One important thing to watch for during the external inspection of a boiler, especially the bent tube type equipped with soot blowers, is to see that none of the soot blower elements are rubbing the boiler tubes. If a soot blower element and boiler tube get together, the element will wear a groove in the tube and cause it to "let go."

Such a condition may be brought about by wear in the soot blower element bearings, by the boiler tubes bulging out of line, or sometimes by a combination of both. Sometimes the element bearings should be replaced or set so the element will clear the tube. In making such an adjustment, care must be exercised to see that the element nozzles direct the steam jet between the tube rows in its new position. Steam impingement on a tube, likewise, will cut a groove in a very short time.

When wearing of a tube is discovered, it can be repaired by fusing the metal into the groove through electric welding. Then if it seems necessary, a metal strip of suitable size can be welded on this tube or on an adjacent tube to prevent further wearing.

Recently, a pulverized fuel fired, bent tube type boiler, with convection and radiant superheaters was coming on the line, when one of the superheater elements burst. The lower clamps supporting the element broke and allowed the element to swing out into the flame path.

When repairs were made, and the boiler was put back on the line, it was discovered that the exit gas temperature was higher than before for the same load. Yet the draft gauges and air flow were in their proper relations. An analysis of the flue gases showed a high excess air. Checking of the draft gauges and air flow revealed that when the superheater tube "let go," thereby putting a pressure in the boiler setting, all the pipes leading to these instruments were clogged with fine ash. This condition made all of the gauges off about the same amount, a condition set to fool a person, if it had not been for the exit gas recording thermometer.

◆ Regional Pulpwood Price Adjustments

According to information published in the February issue of American Paper and Pulp Association's *Monthly Review*, operations in pulpwood were probably lower in 1932 than in any recent year. The carry-over from 1931 of pulpwood stocks was unusually large, which, combined with the uncertainties of production during 1932, resulted in curtailment in current operations. The abnormally low demand for pulpwood, coupled with the adverse agricultural situation which forced farmers to cut even larger than normal quantities of wood, resulted in an oversupply which was reflected in the sharp decrease in pulpwood prices.

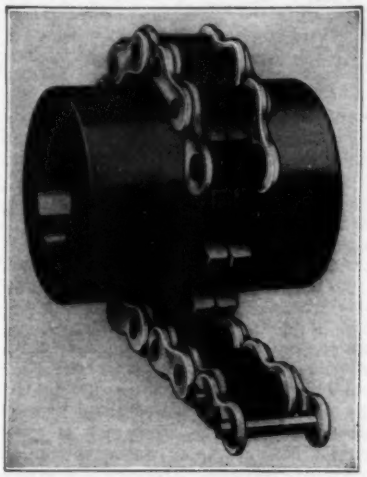
The reduction of pulpwood prices has been the heaviest in regions of high costs. The differentials between the regions are today approximately related to the freight differentials in shipping finished products to common markets. In this adjustment, it is apparent that an economic basis for regional differentials has been established which will in the future remain relatively stable except for the establishment of a new basis of differentials for qualities. Although this adjustment has been a violent one and has seriously affected all producers, it has been, nevertheless, necessary.

◆ THOMAS A. MARSH has become a partner in the Ernest E. Lee Co., Chicago, manufacturers' representative. Mr. Marsh was for ten years chief engineer of the Green Engineering Co., for seven years Western Engineer for the Combustion Engineering Corp. and for three years president of the Modern Coal Burner Co.

◆ New Flexible Coupling

Link-Belt Company, Indianapolis, Indiana, announces the development of a new flexible coupling in which the company's recently announced "RC" Silverlink Roller Chain will be used.

The new coupling, to be known as the Link-Belt "RC" Flexible Coupling, consists simply of two cut-tooth sprocket wheels (or coupling halves) and a piece of roller chain to connect them, all working surfaces being machined to close tolerances. A pin-and-cotter link makes it easy to couple or remove the chain when desired.



Where the operating conditions suggest the advisability of protection from dust, dirt or other adverse conditions, the coupling can be enclosed in either a stationary or revolving automatically lubricating oil retaining casing.

◆ The New Seybold Automatic Spacing Cutter

The Seybold Machine Company Division of the Harris-Seybold-Potter Company, Dayton, Ohio, has designed a new automatic spacer cutter and trimmer which is said to embody many distinctly new features of particular interest to the printing, binding and paper mill industries.

Four different set-ups or sequences of spacing are possible. At any one time, the rotatable spacing bar is four sided, with each side carrying a set of stops so that any one set of stops may be rotated into position. The operator may pass from sequence to another without additional set-up time, and without interference. A production run can be interrupted for other work, and then resumed without disturbing any of the automatic stops.

The new spacer automatically positions the work pile for each succeeding cut. Forward motion of the back gauge is started automatically after each cut. The back gauge has two forward speeds, fast for bringing work close to the stopping point, and slow for accurate positioning of the stop. The back gauge returns by power and can also be traversed manually fast or slow, forward or reverse.

A friction drive to a gear box located in the rear of the machine protects against any possibility of jamming the mechanism. Manual and automatic controls are electrically and mechanically interlocked to prevent dual operation or jamming. An illuminated scale shows the back gauge position, and a red signal light indicates the cutting line of the knife for setting the stops and also shows when the machine is in readiness for the cut.

◆ Quigley Company Adds to Line

A recent addition to the line of refractory cements and plastics of the Quigley Company, Inc., New York City, is known as CAST-REFRACT. This refractory can be cast or molded on the job into any desired shape or form. It air-sets quickly with high structural strength, and can be put under full heat within 24 hours or less.

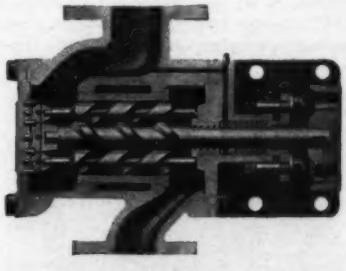
The refractory is shipped dry, and mixed with water on the job to bring it to a stiff mortar-like consistency. It is then handled much like a concrete mixture. Forms, however, may be removed within two or three hours after the material has been put in place. Resistance to spalling and excellent refractory properties up to 2600 deg. to 2800 deg. Fahr., are two of the advantages suggested by the manufacturers.

◆ A Rotary Displacement Pump

A new type of rotary displacement pump shown in section in the accompanying photograph embodies a number of interesting features.

Power is applied to a central or power rotor, which meshes with one or more sealing rotors of such form that they are propelled largely by fluid pressure, with a minimum of mechanical contact. This action results from the ingenious shape of the threads, those of the power rotor being convex, while those of the idler rotor are concave.

There are only three moving parts, and except for small thrust buttons to maintain the relative axial positions of the rotors, no separate bearings are used, nor are pilot gears required. Only one stuffing box is necessary.

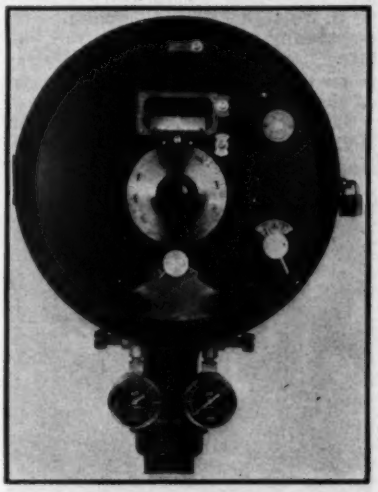


These pumps have been developed by the De Laval Steam Turbine Co., Trenton, N. J., and are known as "De Laval-IMO" pumps. They are available in capacities ranging from ½ to 700 gallons per minute, and for pressures up to 500 lbs. per sq. in. Pumps for higher pressures and capacities can be supplied. A bulletin listing these pumps for oil service is available.

◆ Potentiometer Stabilog

The Potentiometer Stabilog—an instrument combining the features and advantages of Stabilog control and potentiometer temperature measurement—is the latest addition to the complete line of control equipment manufactured by the Foxboro Company of Foxboro, Mass.

Through the development of this instrument, the automatic control provided by the Stabilog system is made available for temperatures up to 2800 deg. Fahr. (1500 deg. C.). In addition, the long-distance feature of the potentiometer measuring system makes the instrument particularly valuable where there is a great distance or height between the point of measurement and the controller. Where it is desirable to use this instrument on the lower temperature ranges, the Wheatstone bridge and resistance bulb measuring system is used.



The Potentiometer Stabilog is a non-recording instrument but it is so constructed that a record of its operation may be made on a Foxboro recording potentiometer pyrometer using the same thermocouple. One multiple-point recorder may be hooked up with as many as six Potentiometer Stabilogs, thus recording and controlling from the same thermocouples.

A preliminary description of this instrument has been prepared by the Foxboro Company and may be obtained by writing them.

◆ Thermostatically Protected Motors

A completely self-protecting motor which cannot burn out and yet carries overloads just as long as the motor itself is not in danger has just been announced by the Westinghouse Electric & Manufacturing Company. A small disc type thermostat mounted on the motor frame opens the circuit when the motor gets

too hot and connects it again after the motor has cooled.

The thermostat's operations depends upon a combination of the actual motor frame temperature and the line current through the motor. At each load up to the pullout point of the motor, there is a definite length of time required for the motor to reach the temperature which causes the thermostat to open its contacts removing the motor from the line. The higher the overload the sooner the motor disconnects itself.

◆ Variable Speed Development

A new variable speed device has been brought out by U. S. Electrical Manufacturing Co., Los Angeles, California, in its U. S. Varidrive motor. It consists of a simple squirrel-cage motor and a variable speed differential which comprises dual discs coupled with a so-called U. S. Varibelt. The differential discs reciprocally expand and contract for higher or lower speeds, transmitting power through the Varibelt to the take-off shaft.

The Varidrive motor is arranged for local or remote control. A handwheel is mounted on the unit for local control.

For remote control, a push button station or a handwheel may be installed at the most convenient location for the operator or automatic remote control may be employed. A speed indicator mounted on the case furnishes visual observation of the revolutions per minute of the take-off shaft. The speed of the take-off shaft, instantly controllable while the driven machine is in motion, may be altered by as little as one revolution per minute throughout the entire range for which the unit is built.

The manufacturers will be pleased to submit more detailed information concerning this development upon request.

◆ New Bag Machine for Side Seam Flour Bags

The Smith & Winchester Manufacturing Company, South Windham, Conn., has developed and built a new straight-line tuber for side seam flour bags which have printing on all four sides.

Speeds up to 800 feet per minute have been obtained and electric-eye control is said to guarantee an even seam regardless of uneven or dished rolls.

The thumb cut is driven by a shaft between the frames instead of outside, making it easier to get at the table and set the machine. It is also possible to vary the angle of approach of the paper to the former shoes, increasing the accuracy of the fold and reducing waste.

This new machine can be used for duplex as well as single tubes and produces bags from 9 to 44 inches long and from 5½ to 15 inches wide. Descriptive literature may be obtained from the company.

◆ Kron Re-Designs Scales

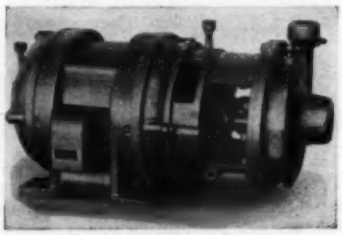
The Kron Company, Bridgeport, Conn., has announced the completion of the redesigning of its entire line of automatic dial scales, which includes portable and dormant platform, track, hopper and crane scales, etc.

The platform designs have been simplified in some cases with the elimination of intermediate levers. In certain types, overhead lever systems have been improved through the application of a different type of knife edge to give a longer life.

Illustrated bulletins, describing the new line may be had on request through representatives of the company or from the home office in Bridgeport.

◆ SSU Pumping Units

The Allis-Chalmers Mfg. Co., Milwaukee, Wis., has extended its line of "SSU" motor-driven, single-shaft, two-bearing pumping units. Three sizes have now been developed to work against heads up to 100 lb. (231 ft. head) and above and covering a range in capacity from 30 g.p.m. to 140 g.p.m. These pumps are said to fill the need for high head pumps of low capacities at low cost.



◆ Square-End Sawing Vise

A vise for cutting square ends on thin wall copper or brass tubing has been placed on the market by The Borden Company, Warren, Ohio. It is of simple design and is made of aluminum with steel inserts to increase strength.

A long "V" trough insures the centering of ⅛-inch to 2-inch tubing that is locked into position by means of a reversible vise block. A convenient thumb screw prevents over-pressure and crushing, while a saw guide prevents the sawblade from running.

◆ G-E Capacitors Now Pyranol-Filled and Treated

A new General Electric line of capacitors for power-factor correction are treated and filled with Pyranol, an outstanding dielectric material with extraordinary insulating and dielectric properties that permit an unusually small capacitor for a given rating, and which is noninflammable and nonexplosive. The line also includes new box-type units and small rack-type capacitors, both for indoor service.

The individual capacitor unit consists of one or more flattened rolls of paper and aluminum foil, pressed together, and enclosed under Pyranol in a hermetically-sealed steel case. The rolls, each having two sheets of foil separated by thin laminations of paper, are connected in either one, two, or three groups for single-, two-, or three-phase units, respectively; the leads are brought out of the case through porcelain bushings.

The new box-type capacitors, for indoor service, are of the type which can be connected directly to motor terminals or to the line side of a motor switch. These units are enclosed in welded sheet-steel cases and provided with conduit boxes.

Although large rack-type capacitors for both indoor and outdoor service have been part of the G-E line for some time, the new small rack-type units are an innovation. A line of racks and individual units which are provided with individual fuses can be combined as desired over a wide range of kv-a. ratings, simplifying the application of small blocks of corrective capacity for industrial plants because the small size of the capacitor greatly reduces space

requirements and permits the capacitor to be placed at the most advantageous location from the standpoint of reduction of line loss.

◆ A New Type of Boiler Tubing

Steel and Tubes, Inc., Cleveland, Ohio, a subsidiary of the Republic Steel Corporation, announces the development of electric resistance weld boiler tubes, to be marketed under the trade name of Electrunite Boiler Tubes. These new tubes have been recommended by the American Society of Mechanical Engineers for use in pressure boilers, and bear the approval of both the United States Department of Commerce Steamboat Inspection Service, and the American Bureau of Shipping. Before publicly announcing this product to buyers, many installations were made and closely observed for operating characteristics.

The tubing is formed from strip steel continuously, the strip being passed through a series of forming rolls. The round butted tube thus formed then passes under revolving wheel-like copper electrodes where current travels from electrode to electrode through the butted seam of the tube. At the same time, pressure is applied which, together with the heat which is below the fusion temperature and which is confined to an area no larger than a pinhead, completes the weld. The tubing is later normalized and fully tested in accordance with accepted A. S. M. E. Specifications.

The manufacturers claim superiority in their product because of the extreme uniformity of diameter and wall thickness, and a fine strip steel surface quality inside and outside the tubes.

This new type of boiler tubing is available in all sizes up to 5 inches O. D., in copper bearing, nickel steel and Toncan iron, as well as the usual open hearth steel.

◆ Improved Design of Feed Water Regulator

Northern Equipment Co., Erie, Pa., announces an improved design of the Copes Series Type Feed Water Regulator. This regulator feeds the boiler in accordance with steam flow, with compensation for water level. The new design has been developed as a result of tests made at Bohlen Power Station in Germany.

A new type of mechanical transmission makes it possible to locate the steam flow thermostat near the connections to the steam header. This simplifies erection and adjustment of the regulator, assuring more accurate results.

With the new Series Type Regulator, it is an easy matter to increase or decrease the influence of either steam flow or water level thermostat. This means that almost any desired proportion between steam flow and water level can be obtained without difficulty.

The Series Type Regulator can be equipped with either direct-acting or hydraulically-operated control valve, or with a combined feed flow and water pressure regulating valve. Present installations of Copes Feed Water Regulators equipped with tension type thermostats may be changed over to the new design of regulator if desired.

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◆ Affairs of Wheelwright Plants Adjusted by Court

Through co-operation with the receivers of the George W. Wheelwright Paper Company who have been ordered by the court to close the Hardwick mill, The Mead Sales Company, Inc., New York, has acquired the Hardwick inventory and arranged to perpetuate the stock lines, as well as the specialties manufactured there for many years. These lines will be manufactured by Dill & Collins, Inc., of Philadelphia and distributed through the Wheelwright agents as heretofore.

Under the court order, the Leominster mill of the George W. Wheelwright Paper Company, producing bristols, indexes and blanks, will continue to operate under the direction of George W. Wheelwright. The sales will be handled by a new company to be known as Wheelwright Papers Inc. Messrs. E. W. Pierce, R. N. Finlay and Butler Cox of the Wheelwright sales force have joined the new company and will continue to handle the distribution of both the book and bristol lines.

◆ Riley Stoker Makes Branch Office Changes

The Riley Stoker Corp., Worcester, Mass., announces that all sales of Riley steam generating and fuel burning equipment in the Chicago territory will be handled by Messrs. Hardin, Oswald and Moyer. C. L. Smith continues at the Chicago office which will remain at 1101 Marquette Building.

The company has established an Indianapolis office which will be located in the Continental Bank Building, and in charge of B. J. Schneider.

◆ F. C. EIBELL, for the past four years manager of the advertising and publicity department of the Worthington Pump and Machinery Corp., New York, has resigned. No announcement has been made concerning his future plans.

◆ WM. H. SUNSHINE, sales manager of the Tarentum Paper Mills, Tarentum, Pa., passed away February 19, at his home in Tarentum.

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◆ New Catalogues and Publications

Atlas Valve Co., Newark, N. J.—This company announces a new data and price book pertaining to its Victor self-contained vapor types of temperature regulators for liquids. Four types of regulators are featured. In addition to descriptions of the regulators, considerable space is devoted to illustrations of actual applications to fuel oil control, desuperheating, and controlling the temperature of liquids under various conditions.

Blaw-Knox Co., Pittsburgh, Pa.—A new folder, No. 1417, just issued, is devoted to an explanation of the construction and operating principle of the company's new Desuperheater. The apparatus is illustrated and a sectional view shows it in operation.

Diamond Rubber Co., Akron, Ohio—This company's new Buyer's Guide to Mechanical Rubber Goods has just been issued. There are 24 pages full of illustrations and data on many of the most widely used mechanical rubber products. There are also standard stock sizes and list prices. One important section is headed Facts About Rubber Belts, describing construction, function and applications, together with a data table making it easy to figure the type and size belt needed under given conditions. Copies on request.

Foster Wheeler Corporation, New York City—This company's new general catalogue is being distributed. It is made up in loose-leaf form to permit revision of any section as need arises. All the major pieces of power plant equipment manufactured by the company are included in the catalogue, which is nicely bound for appearance and durability.

Grasselli Chemical Co., Cleveland, Ohio—A new chemicals booklet is now available to anyone who is interested in the purchase of chemicals. This company has added several new products to its line which are included in this latest booklet.

Metropolitan Life Insurance Co., New York City—The Policyholders Service Bureau of this company has just completed a survey of methods of organizing and conducting industrial safety contests. The results, which have been published in booklet form, display an illustration of THE PAPER INDUSTRY plaque awarded to The Champion Coated Paper Co., Hamilton, Ohio, at the National Safety Congress in Washington, D. C., last October.

J. O. Ross Engineering Corp., New York City—A bulletin just published carries the title The Ross Conditioning Unit, and features this company's very latest development, which is a new equipment for conditioning paper testing rooms. The system is briefly described in this bulletin and its purpose set forth. There is a graph showing variation in physical properties of paper with changes in humidity, and charts which register different testing conditions. The cover carries an illustration of the interior of a typical paper testing room.

J. E. Swendeman, Inc., Boston, Mass.—The new Swendeman Model F steam trap is featured in a bulletin just received. The three features claimed for this trap are: (1) Tell-U-When—which indicates at a glance if the valve is wire drawn and wasting steam; (2) The Air Vent—continuously discharges the air as it comes into the trap and prevents trap from becoming airbound; (3) The Union Connection—permits the replacing of valve and seat in 3 minutes.

BOOKS

The Finnish Timber and Paper Calendar 1932-1933, edited by Onni O. Ojala, contains nearly 500 pages of directory information on the various wood using industries of Finland, together with general information of importance. The paper and wood pulp section of the book includes a brief historical sketch on the development of the industry in Finland, gives statistical data on exports of pulp and paper and lists the various organizations associated with the industry, in addition to the directory listing of mills. The book should serve as a valuable source of reference to anyone interested in any of the wood using industries of the country and may be purchased direct from The Finnish Timber and Paper Calendar, S. Esplanadgatan 2, Helsingfors, Finland, or through Thomas J. Stobart, Cathedral House, 8-11 Paternoster Row, London E. C. 4, for 12 shillings, postpaid.

POWER

GENERATION + UTILIZATION + MAINTENANCE

This section turns the searchlight on power and its allied problems, showing big possibilities to save. Opportunities to improve conditions, methods, apparatus will be discovered. Worth while practices suggest new ideas and wider usages of equipment.

By W. S. JOULE

◆ Locating Condenser Leaks

If leakage is caused by the failure of one or two tubes, they can easily be located by emptying the water boxes of the condenser, taking off the manholes so that the tube ends are available and maintaining a slight vacuum in the steam space. Often the tube can be located by a hissing sound, by running a dampened hand over the tube ends quickly or by a candle. When maintaining a vacuum in the steam space while the turbine rotor is stationary, the turbine shaft should be packed so as to eliminate air leakage which may cause uneven expansion and distortion for a considerable period afterward and do damage if the turbine were started.

If the leaks are numerous and small, the vacuum method is not entirely satisfactory and the best method is to fill the steam space of the condenser with water almost up to the last row of blades, if possible. Water will run out of the ends of the leaky tubes. This method also shows up the leaky packing and the ferrules on other leaky tubes can be tightened at the same time. If not too numerous, defective tubes can be isolated by plugging the ends with long tapered wooden plugs driven in almost flush with the end of the ferrule. These tubes can be replaced later when convenient. Spring supported, or suspended condensers must be blocked up so as to support the unusual weight when the steam side of the condenser is filled with water.

Excessive leakage from the water to the steam side of a condenser usually becomes evident to the operating crew before a great while, especially if the increase is sudden, caused, for instance, by a split tube. Changes in the boiler water analysis, condensate pump performance and decrease in the amount of boiler feed makeup are usually sufficient to tell a wide-awake operator that something has gone amiss. Unfortunately, small leaks or those that start gradually are not so easily detected. Commercial recording or indicating leakage meters have come into wide use of recent years and plants that do not have them usually make a practice of taking samples of condensate once or twice or several times a day to have chemical tests made.

Air leakage is not so easily detected nor are the leaks so easily found. Condenser joints, turbine casing, exhaust connections, atmospheric relief valve, low-pressure turbine seal and piping are the most probable points of leakage although porous castings sometimes cause trouble, especially with high vacuums. Little air enters with the steam.

A tight condenser can be operated for a considerable length of time without showing an appreciable drop in vacuum. If, therefore, leakage is suspected it can be checked by closing the valve between the air removal apparatus and the condenser for a certain length of time, say ten minutes, and noting the drop in vacuum. By comparing this with readings taken during the same length of time under different conditions, it is possible to get an indication of the relative air leakage.

The best method of checking air leakage while the equipment is in operation is to station an observer at the air pump discharge and then spray oil of peppermint around the places where air leakage is suspected, such as the low-pressure turbine gland, exhaust connections, expansion valves and joints.

◆ Spring Inspection of Stacks

The discovery lately that a number of steel smoke stacks had corroded at an alarming rate—endangering life and property—together with the fact that the spring months are the ideal months during which inspection can be made and repairs and repainting carried out combine to give this subject more than ordinary importance at this time. A stack subjected to a superficial inspection of the exterior may indicate apparently satisfactory conditions. However, when scrutinized closely by a conscientious man traveling around the stack and up the stack foot by foot, it may be found that this disintegration has proceeded rapidly and expensively. Inspection should be made of the interior as well as of the exterior, of course. Whether corrosion takes place on the inside or outside depends largely upon atmospheric conditions as well as operating conditions; and a stack may be free from corrosion on the inside and yet badly corroded on the outside and vice versa.

In many instances, the exterior of a stack is inspected, while the interior is ignored altogether. This is exceptionally unfortunate, because in the majority of cases interior corrosion tends to be more rapid and pronounced than that taking place on the outside.

Corrosion of the outside of a stack is due in part to the elements and the acids and sulphur fumes of combustion that attack steel quite rapidly in the presence of moisture. Prevention is a comparatively simple matter, and one which is not really expensive. The remedy is to paint the steel with a paint that is acid and moisture proof, that can expand and contract with the surface it covers, that will not peel or blister due to heating of the stack.

The painting should be done carefully and conscientiously, using not less than two coats, otherwise pin-hole abrasions may occur, thus failing to give complete protection. Painting should be done regularly to obtain the full benefits of the painting, the frequency depending of course upon local conditions. Every two years seems to fulfill all requirements for average cases.

◆ Proper Water Treatment Reduces Pipe Repairs

Considerable pipe maintenance may be caused by the character of steam and return condensate carried. Improper boiler water treatment may be responsible for scaling up piping by deposit of solids from the water and this will eventually lead to improper operating conditions due to reduced pipe capacities and to ultimate necessity for cleaning. Where scaling is considerable no internal treatment for removal of scale has been found that is as satisfactory as replacing the pipe. This is a major operation, but it may be necessary.

Boiler water treatment therefore stands out as the predominating cause of pipe maintenance work. A steam or water carrying dissolved oxygen is powerless to do much damage to the pipe walls as long as they are protected by a coating of scale or oil, or both, but, when proper boiler water treatment has cleaned the surfaces of the pipe, it becomes necessary to give attention to deaeration of feedwater to prevent corrosion of pipe.

◆ MANY ENGINEERS operate their power plant equipment the same way as they operate their automobiles: they keep it running as long as it will, having repairs done only when they are absolutely necessary to get the car back in service. A definite policy in regard to maintenance and overhauling will not only cut maintenance costs but will lengthen the life of equipment, tend to eliminate overtime and expensive service interruptions. Moreover, it may enable men to be kept on the pay roll instead of being laid off. Schedule upkeep and maintenance on the basis that "a stitch in time saves nine."

+ CANADIAN NEWS +

◆ Gain in January Newsprint Output

Production of newsprint by the Canadian mills in January was a little higher than in December, while that of the United States mills was lower on the same comparison. Output of both the U. S. and Canadian mills shows a decline in comparison with January of last year. Output in Canada was 140,539 tons, against 138,682 tons in December and 171,321 tons in January of last year. Shipments from Canadian mills were lower in January at 133,056 tons, against 138,682 tons in December and 171,843 in January 1932.

The value of newsprint exports from Canada in January was nearly half a million dollars lower than in the previous month and more than three million dollars lower than in the same month of last year, the actual figures being: January, 1933, $5,204,445; December, 1932, $5,666,412; January, 1932, $8,661,086. The United States was the principal market for these exports.

During 1932, Canada exported 1,781,763 tons of newsprint, as compared with 2,008,237 tons in 1931. Of the total for 1932, 1,520,294 tons were shipped to the United States and 261,469 tons were shipped overseas, while in the preceding year overseas shipments totalled 254,823 tons.

◆ Frank J. D. Barnjum

Frank J. D. Barnjum, Canadian lumberman, passed away at the Neuilly Clinic, Paris, France, on February 18. Author, as well as forestry expert, Mr. Barnjum of late resided at Annapolis, Maryland. His son was in Paris with him, while his widow is at present in Lynnfield, Mass.

Mr. Barnjum was a descendant of Sir Francis Barnjum, a man of importance in Britain in the sixteenth century. He was born in Montreal and started his business career as an office boy for a stock brokerage house in Montreal. He started at the age of 13 years at a salary of $50 per year.

The lure of New England, after a long and arduous apprenticeship, brought him to Boston, where he went into the business of buying and selling supplies used in the tanning industry. He later bought a bankrupt stock farm and made $25,000 in three years through trading in horses. After this he went to the state of Maine, where he first entered into the business which thereafter was to become, in one way and another, his life's work. He bought and sold many timber tracts in Maine, New Brunswick and Nova Scotia.

In 1925, he was elected a member of the Nova Scotia Legislature for Queens County, on that occasion promising that he would erect a 250-ton paper mill if the Armstrong Government were defeated. He resigned his seat in 1927.

His efforts as a forest conservationist date back to an early appreciation of the fact that it takes nature fifty years and upwards to produce a tree suitable for the lumberman's axe. He was responsible for the cutting down of many a tree, an enterprise which he pursued with great enthusiasm; but he never forgot that it would take nature from fifty to two hundred and fifty years to replace these trees, and he put just as much enthusiasm into spreading his propaganda for reforestation and conservation.

◆ Newsprint Stays on Free List

An attempt by the Papermakers' Association of Great Britain to remove newsprint from the free list failed last month before the advisory committee on import duties. In refusing the application of the association, which wanted protection for British newsprint manufacturers, the committee observed that the output of newsprint in Britain had risen substantially in recent years and equalled, after deducting exports, two thirds of the British consumption.

On the other hand, the committee pointed out, foreign imports had relatively fallen off. The imports in 1932 represented less than one-seventh of the consumption. The committee were also impressed by the fact that the supplies from abroad were from overseas parts of the Empire that merited the business. Besides, the committee declared, home mills were obtaining ever-increasing business at satisfactory prices.

Refusal by the advisory committee to recommend imposition of a tariff on newsprint will have no effect on the present status of importation of Canadian newsprint into Great Britain.

◆ THERE IS MUCH TALK about the possibility of a merger between Price Bros. and Co. and Consolidated Paper Corp. It is said the matter is being actively discussed and is looked upon with favor. Price Bros'. mills have a capacity of 1,020 tons of newsprint per day, and the Consolidated mills of 1,944 tons. Thus, if the two were merged the joint capacity would be 2,964 tons. According to official rating, the capacity of all Canadian mills is 12,450 tons daily. At present the two largest newsprint operators in Canada are Canadian International Paper with 2,534 tons capacity per day, and Abitibi with 2,013 tons capacity.

◆ ANGLO-CANADIAN Pulp and Paper Mills, of Quebec City, and Don Valley Paper Co., of Toronto, were the winners in the "Safest Mill in Canada" contest for which trophies are donated by "Pulp and Paper of Canada." Anglo-Canadian won the Class A trophy for large mills and Don Valley the Class B trophy for smaller plants. The contest ran from July 1st to December 31st, 1932, and was close all the way. Don Valley had no lost-time accidents during this period.

QUEBEC

◆ Decline in Earnings of Building Products

For the year ended December 31, 1932, the report of Building Products, Ltd., shows net profits at $9,068, as compared with $263,820 in the preceding year. President P. R. Allen stated in his report to shareholders that after providing reserves for all known contingencies, including depreciation on all plants and properties, the profits for the past year were $66,481.

Dividends of $1.35 per share were paid on both Class A and Class B shares of the company for the year ended December 31st, 1932. The creation of new products has played an important part in the past success of this company, and during 1933 the company expects to announce some new building products.

Working capital position was relatively well maintained during the year, standing at $1,835,891 at the close of the period, as against $1,894,092 at December 31st, 1931, and with $1,827,925 at the close of 1930. In its profit and loss account the company shows $87,413 drawn from reserve for investments, while of this amount $30,000 was written off against bad debts. After the payment of $163,142 in dividends the company showed a debit balance of $154,073, while the profit and loss surplus was reduced by $96,661 to $860,116.

◆ Rolland Paper Shows Slight Reduction in Earnings

At the annual meeting of the Rolland Paper Co., manufacturers of fine papers, held last month, a net revenue was reported for 1932 of $323,764 after all operating expenses but before depreciation. This compares with $346,876 in the preceding year. Fixed charges, including premium on United States exchange, were earned 2.20 times. After payment of bond interest and exchange and providing $84,000 for depreciation (the same as in 1931), together with $90,000 for preferred dividends and $2,000 as proportion of organization expenses written off, there remained a balance of $983 to be carried to surplus account, which now stands at $313,187.

The balance sheet again showed improvement in working capital, the latter amounting to $1,071,199 as against $1,020,331 at the end of 1931.

ONTARIO

◆ Hinde and Dauch Co. Had Better Year

Although progressively declining prices during most of the year made operations difficult, the annual financial statement of Hinde and Dauch Paper

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Co. of Canada, Ltd., showed the benefits derived from economies in production. In the year ended December 31, 1932, the company realized net profits from operations of $205,818, as compared with an operating loss of $33,771 in 1931. After the usual charges for depreciation amounting to $180,948 and the payment of bond interest and exchange premium of $82,141, the company showed a deficit in the year's operations of $57,271, as compared with a deficit of $298,466 the previous year.

The liquid position of the company is shown to be satisfactory, and bank loans amounting to $125,000 at the end of 1931 were eliminated during 1932. Working capital was increased during the year from $386,722 to $422,410, and as a result of customary sinking fund purchases the amount of first mortgage bonds outstanding was reduced from $1,363,500 to $1,289,500.

In the course of his remarks, President Sidney Frohman pointed out the relatively satisfactory results of the year's operations and stated that the company's facilities had been maintained and that any normal return of volume would find the company prepared, not only to supply promptly trade requirements, but that better volume would also result in profitable operation at prices not higher than those in effect during the past year.

At the annual meeting, L. F. Winchell was elected vice-president, T. E. Lloyd was re-elected treasurer and director, and M. H. McArthur, general sales manager, was elected a director of the company.

◆ OPERATIONS OF GREAT LAKES Paper Co. have recently been stepped up as the result of new contracts secured during the past few months. For the first time in its history the company is now carrying a large proportion of its contracts in its own name, and, while profits from operations are not substantially larger, due to lower prices prevailing on newsprint, it is the opinion of those closely in touch with operations that the company is in better shape than ever before to take advantage of any improvement in the newsprint situation. Tenders have been called for a storage shed and conveyor with the intention of shipping production by water during the coming summer. This is expected to reduce transportation costs. The purchasing department has largely been transferred from Minneapolis to Fort William, thereby consolidating operations in Canada.

◆ Provincial Paper Maintains Strong Position

For the year ended December 31, 1932, Provincial Paper, Ltd., showed earnings, before depreciation and interest, of $614,678, as compared to $782,784 in 1931. In 1932 interest charges were earned over twice after charging depreciation. After interest charges and provision for depreciation there remained a net profit available for dividends of $275,364.

The balance sheet shows the company has maintained its strong financial position. Current assets at $2,344,530 were over eight times current liabilities of $272,099, and it is noteworthy also that cash alone amounted to $386,364 and Dominion of Canada bonds held had a market value in excess of $500,000. Net working capital of $2,072,431 compares with $2,083,420 at the close of the preceding year. During the year, however, fixed assets increased $50,412 and the company redeemed $125,000 of its first mortgage bonds.

In combined output Provincial Paper is one of the largest manufacturers and distributors in Canada of high-grade coated and book papers, its four plants, all in Ontario, operating eight paper machines, six paper-coating machines and sulphite and groundwood mills having a daily capacity of paper production of more than 190 tons. Its timber limits are advantageously located near the company's pulp and paper mill at Port Arthur.

◆ F. N. BURT CO., Ltd., manufacturer of paper specialties, reports gross profits of $420,315 for 1932, as compared with $532,161 for 1931. After all deductions, $1.63 is available for the common stock, as compared with $2.62 for the previous year. Working capital stands at $1,314,905, as compared with $1,363,235 at the end of 1931. With the addition of $192,730 for the year, depreciation reserve stands at $2,131,112, or more than 50 per cent of the book value of fixed assets, carried at $4,144,126.

NEW BRUNSWICK

◆ Fraser Companies' New Plan Effective

Holders of Securities of Fraser Companies, Ltd., and its subsidiary, Restigouche Co., Ltd., have been notified by the directors that the plan of reorganization of the financial structure of these companies is now in effect, the official notice stating that the scheme has been duly sanctioned by all necessary meetings of holders of securities and shares. Exchange of securities will be effected on the following basis:

(1) Holders of first mortgage bonds of Fraser Companies to receive new mortgage bonds at par for par.

(2) Holders of three-year collateral trust notes of Fraser Companies to receive (a) payment in cash of interest for January, 1932, on notes surrendered, and (b) delivery, par for par, of mortgage bonds of Restigouche Co.

(3) Holders of debentures of Fraser Companies to receive voting trust certificates representing common shares at the rate of two such shares for each $100 principal amount of debentures.

(4) Holders of three-year unsecured notes of Fraser Companies to receive voting trust certificates representing common shares at the rate of two such shares for each $100 principal amount of notes.

(5) Holders of common stock of Fraser Companies to receive new common shares at the rate of one such share for each 20 shares surrendered.

(6) Holders of first mortgage bonds of Restigouche Co. to receive new mortgage bonds, par for par.

Fraser Companies intend to construct a dam on Stone Brook and another dam on Rivières des Aigles, a tributary of Lake des Aigles, both in Rimouski County, Quebec. Plans and specifications of the proposed works have been forwarded to the Quebec Department of Lands and Forests.

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◆ Report on News Print

According to statistics of the News Print Service Bureau, production in Canada during January, 1933, amounted to 140,539 tons and shipments to 133,056 tons. Production in the United States was 74,444 tons and shipments 72,725 tons, making a total United States and Canadian news print production of 214,983 tons and shipments of 205,781 tons. During January, 22,207 tons of news print were made in Newfoundland and 1,408 tons in Mexico, so that the total North American production for the month amounted to 238,598 tons.

The Canadian mills produced 27,095 tons less in January, 1933, than in January, 1932, which was a decrease of 16 per cent. The output in the United States was 19,872 tons or 21 per cent less than in January, 1932, in Newfoundland 1,784 tons or 7 per cent less, and in Mexico 153 tons more, making a total decrease of 48,598 tons or 17 per cent from January, 1932.

Stocks of news print paper at Canadian mills are figured at 49,837 tons at the end of January and at United States mills 23,502 tons, making a combined total of 73,339 tons, compared with 64,137 tons on December 31, 1932.

◆ Plan to Produce Paper From Straw

A proposal to establish a plant to manufacture paper from straw is under consideration by a number of representative business men of Edmonton, Alta., according to reports received by the industrial department of the Canadian National Railways. An initial capital investment of $50,000 would be involved. The manufactured articles would comprise wrapping paper, building paper, insulating boards, bottle wraps and carton boards.

Successful results in the manufacture of such products from straw has resulted in a small experimental plant operated at Edmonton by George K. Guild. Waste straw, of which there is an abundance in the Edmonton district, one of the great grain growing areas of the west, would be ultilized as raw material for the plant. It is believed production could be established on a basis of six tons of paper per day.

◆ DOMINION Engineering Works, Montreal, announces the appointment of Hugh Crombie as Sales Manager to fill the vacancy caused by the passing of John Drysdale Robb.

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◆ Studies by Bureau of Standards

By measuring the moisture content of several different types of lithographic papers at different successive relative humidities, the Bureau of Standards has secured further information that may assist lithographers in overcoming some of their printing difficulties. Both the moisture content of lithographic papers and the rapidity with which the content varies play an important part in the printing operations. For obtaining close register of successive color prints, the moisture content of the paper must be kept as uniform as possible because even small variations in moisture cause too much expansion or contraction of the paper. For accurate printing, the paper is generally conditioned, that is, exposed to air of fixed humidity until the moisture in the paper is in equilibrium with that of the air. This equilibrium must be maintained as closely as possible throughout the successive prints, and sometimes reconditioning is necessary between prints. The rapidity with which this can be done is important because conditioning is an expensive operation, and because delays here may mean such troubles as idle presses, and delayed deliveries of printing jobs.

In the Bureau study, it was found that the moisture contents of all of the papers increased at a practically uniform rate as the relative humidity of the surrounding air was increased from 33 per cent to 65 per cent. The average increase in this range was approximately 0.7 per cent for each 10-point rise in relative humidity. Above 65 per cent, the moisture change was more rapid. The moisture content of a paper when conditioned to equilibrium with the atmosphere of a given relative humidity varies according to direction of approach, that is, whether the moisture content of a dry paper has been brought up to or that of a moist paper down to balance with the fixed condition. The average moisture contents at 45, 55, and 65 per cent relative humidities were 5.6, 6.2, and 6.9 respectively when approached from below and 6.4, 7.1, and 7.7 per cent when approached from above. This indicates that in conditioning paper, uniformity as regards direction of approach to a fixed atmospheric humidity is as important as uniform control of humidity.

The rate of conditioning to equilibrium with a fixed condition of relative humidity was quite rapid for all papers studied regardless of the moisture content at the start. Specimens of the different types of papers, having moisture contents varying from approximately 4.7 per cent to 8.2 per cent, all practically reached equilibrium with an atmosphere of 45 per cent relative humidity after 40 minutes exposure. This represents time under ideal laboratory conditions. In industrial conditioning, the time, of course, would vary with the kind of conditioning treatment employed. Also, more time would be required for harder and more compact papers such as bonds and ledgers.

Commercial Paper Testing and Research Facilities—A recent survey made by the Bureau, by means of a questionnaire addressed to the known laboratories that specialize in paper testing commonly applied to paper products and to the raw well served in this respect. Among the eight different laboratories that do specialized testing of this kind, can be found facilities for all types of chemical and physical testing commonly applied to paper products and to the raw materials used in their manufacture. The official testing methods of the Technical Association of the Pulp and Paper Industry are in general use in these laboratories. In addition to the usual microscopical equipment, some of the laboratories have facilities for photomicrographs and other means of illustrating micro characteristics. The research side is also well taken care of by some of these laboratories, and several additional ones that specialize in this branch of work particularly. Laboratory and semi-commercial equipment, including paper-making machinery, is available for the wide variety of problems encountered in improving paper-making processes or developing new ones.

Detailed information on these commercial testing facilities is maintained at the Bureau for free distribution because of the many requests for such services received. The Bureau limits its paper testing work for outside organizations to special classes of work such as referee testing where other laboratories cannot agree on fundamental measurements, or where the testing may assist in some research problem of general interest to the public. Information on general com-

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mercial testing facilities for all commodities is contained in the Bureau Miscellaneous Publication No. 90, which can be purchased from the Superintendent of Documents, Washington, D. C. (15 cents, cash).

Influence of Clay Coating on Stability of Papers—In a study of effect of clay coatings relative to lasting qualities of papers, it was found that such processing apparently had no adverse effect on the stability of the papers, and in fact appeared to be beneficial rather than otherwise. Clay coatings, made adherent with casein, starch, or glue, are brushed on papers to obtain the very smooth surface required for half tone and other high grade printings. The high quality of printing for which such papers are used makes their degree of permanence correspondingly important.

In this study, a commercial coating paper of ordinary book grade was coated in the Bureau paper mill on one and on both sides, with casein and glue used separately. The relative stability of the uncoated and coated papers was judged by baking them and comparing the results of physical and chemical tests of the unheated and heated papers. The retention of folding endurance under the heat test was not lowered by any of the coating treatments, and in one case, the paper that was double coated with casein as the adhesive, the retention of folding endurance was appreciably increased. Likewise, chemical tests of the fibers to find any indication of break-down of the cellulose under the heat treatment showed some margin in favor of the coated papers.

The findings are in line with stability tests made by the Bureau on commercial coated papers. While the uncoated "base" papers were not available for comparative tests in these cases, the stability of the coated papers under the heat test was found to be as good as or better than uncoated papers of similar character.

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Boiler Hp. and Mechanical Hp. Compared

By W. F. SCHAPHORST, M. E.

CONSIDERABLE confusion exists in the minds of paper men regarding the relationship between a boiler horsepower and the horsepower of an engine or motor.

Surprising as it may be, a boiler horsepower is 13.2 times as great as a mechanical horsepower. Here are the actual figures:

One boiler hp. = 33,479 B. t. u. per hour.

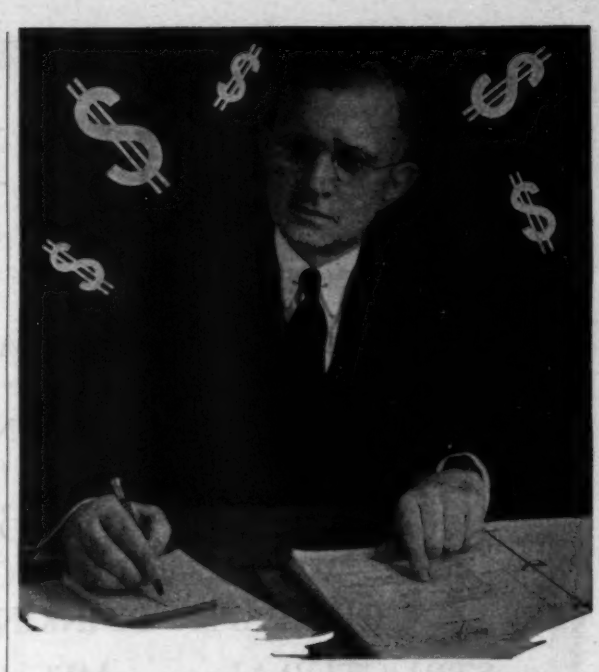
One mechanical hp. = 2544.6 B. t. u. per hour.

The reason for this great difference is that in the early days when boilers and engines were first made and used, a 100-hp. boiler was called a 100-hp. because of its ability to supply enough steam to run a 100-hp. engine. A 200-hp. boiler could furnish enough steam to run a 200-hp. engine. And so on.

But boilers are much more efficient now than they were in the days of James Watt. There has been such an improvement that today a 100-hp. boiler will easily take care of a 250-hp. engine. Engines have improved also, but not to the extent that boilers have improved. Therefore, the old relationship no longer holds, and today a boiler horsepower, according to its modern definition, is 13.2 times as great as a mechanical or engine horsepower.

It is evident that in the old days when one boiler horsepower produced one mechanical horsepower, the efficiency of conversion was only $1 \div 13.2 = 7.6$ per cent. In other words, only 7.6 per cent of the heat energy in the steam was converted into work. Today the best plants show efficiencies that are much greater. The highest reported efficiency, according to available data, is 27 per cent.

The best types of Diesel internal combustion engines are more efficient than the most efficient steam plants. It is not uncommon for Diesel engines to produce efficiencies of more than 30 per cent while records as high as 50 per cent are claimed.



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WATER POWER DEVELOPMENTS

STEAM and ELECTRIC POWER GENERATION and TRANSMISSION

CONSULTATION ESTIMATES APPRAISALS

Inspecting Belt Drives

and Reconditioning Leather Belts

By J. N. SMITH
E. F. Houghton & Company

DURING the past two years many plants have "robbed Peter to pay Paul" in order to keep machines running at a minimum of expense. Belting has been taken off equipment which is temporarily shut down and used on other drives where belts were needed. Then, when the superintendent receives orders to start production on the machines which were shut down, he very frequently finds the belt missing.

This practice is quite common and cannot be condemned. But, on the other hand, the belt should be given more consideration, for without it the machine cannot be operated.

Putting Belts Back Into Service

Many plants undoubtedly have dozens of belts which have stood idle for some time. Before this belting is put back into service it should be carefully inspected and reconditioned if necessary. Belting often deteriorates more rapidly when idle than when in regular use. In addition, many things can happen to an idle belt and invariably the belt will need some attention to place it in first-class condition.

Here are a few conditions which should be checked.

Is the belt saturated with oil or covered with dirt?

Are there any open laps?

Is the length correct?

Examine fasteners for wear or breakage.

Check alignment of pulleys.

If belts have become soaked with mineral oil, degrease them by soaking in gasoline or carbon tetrachloride for 24 hours, or longer if necessary. In doing this, it must be remembered that the degreasing not only removes all mineral oil but also the natural oil which is essential to lubricate the fibers of the leather. Therefore, after the belt has been thoroughly degreased dress it with a good belt lubricant to lubricate and preserve the fibers of the leather.

Do not use a sticky belt dressing as it will not lubricate the leather. Never permit foreign matter such as lumps of belt dressing, dirt, wood chips or adhesive material of any kind to gather on the belting or pulley faces. Clean the belt off by scraping with a dull edged scraper with rounded corners. Do not use a sharp scraper as the fibers of a belt must not be injured.

Check all the laps and see that they have not started to separate, especially the tip of the lap. If it is found necessary to re-cement a lap, be sure to scrape off all of the old cement. The laps should then be thoroughly roughened up, either with coarse emery cloth, a rasp or wire brush before the cement is applied.

A belt which has been left on an idle drive under tension has no doubt become permanently stretched. Therefore, it is wise to remove the belt from the drive and shorten it to the proper length to give the desired tension on the drive. If the drive is to be idle for some time do not install the belt on the drive tight. It is better not to install the belt at all until it is needed.

Fasteners of all types should be gone over carefully. If any of them are either worn or broken they should be replaced immediately. A worn fastener is liable to let go at any time. A broken fastener will not only cause the belt to run crooked but will also damage wood or composition pulleys.

Pulley alignment is very important from the standpoint of belt life and transmission efficiency as well as the operator's safety. It should be carefully checked during your belting inspection.

The application, maintenance and repair of belting should be in the hands of a competent man trained in this service. Many good belts have been ruined by incompetent repairs. If your plant does not have the facilities for properly reconditioning your belting, any reliable belt manufacturer can do this work for you. You will then receive the best job that good workmanship can produce and your machines will be ready when production starts.

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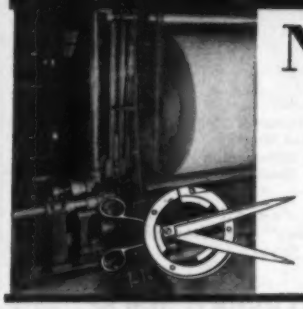

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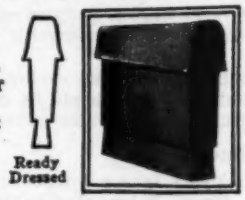

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accommodates specimens 6" x 6" prepared by butting two 3" x 6" pieces of corrugated board along the 6" edge over which is pasted a 6" length of tape.

The breaking point recorded on the gauge indicates that the ultimate strength of the tape has been passed while the failure may appear as only partial.

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The Paper Industry Safety Contest

July 1, 1932, to June 30, 1933
Scores as of January 31, 1933
20 Mills Still in Race

PERFECT SCORES

Division I—Paper and Pulp Mills

	PARTICIPANT	MILL	LOCATION
GROUP A	Hollingsworth & Whitney Co.	Algonquin & Taconnet	Winslow, Me.
GROUP B	The Champion Coated Paper Co.	Paper No. 1	Hamilton, Ohio
	Fraser Companies, Ltd.	Fraser Paper, Ltd.	Madawaska, Me.
	St. Croix Paper Co.	Woodland	Maine
GROUP C	Escanaba Paper Co.	Escanaba	Michigan
	Marinette & Menominee Paper Co.	Menominee	Michigan
	Cornell Wood Products Co.	Cornell	Wisconsin
	Consolidated Water Power & Paper Co.	Appleton	Wisconsin
GROUP D	Consolidated Water Power & Paper Co.	Biron	Wisconsin
	Port Huron Sulphite & Paper Co.	Sulphite	Port Huron, Mich.
	U. S. Envelope Co.	Morgan Paper Div.	Lititz, Pa.
	U. S. Gypsum Co.	No. Kansas City	Missouri
	International Paper Co.	Livermore Falls	Maine
	Container Corp. of America	Carthage	Indiana
	International Paper Co.	Riley	Maine
	Hollingsworth & Whitney Co.	Albenaquis	Madison, Me.
	U. S. Gypsum Co.	Gypsum	Ohio

Division II—Remanufacturing

Kimberly-Clark Corp.	Atlas	Appleton, Wis.
Container Corp. of America	Natick	Massachusetts
Bemis Bros. Bag Co.	E. Pepperell	Massachusetts

IMPERFECT SCORES—Division I

	Key	Rank	Points Credit	Points Debit
GROUP A	PA-11	2	881.008	
	PA- 6	3	724.192	
	PA- 9	4	569.872	
	PA-13	5	536.288	
	PA- 7	6	451.584	
	PA-14	7	294.688	
	PA- 8	8		2525.424
	PA- 5	9		7052.672
GROUP B	PB- 5	4	930.848	
	PB-21	5	925.904	
	PA- 1	6	915.440	
	PB-14	7	857.904	
	PA- 3	8	796.896	
	PB-18	9	686.112	
	PB-17	10	598.384	
	PB-22	11	540.144	
	PB-13	12	504.160	
	PB- 3	13	436.848	
	PB-19	14	387.632	
	PB-20	15	531.872	
	PC- 1	16		327.552
	PB- 6	17		479.280
	PB-12	18		527.792
	PB-15	19		876.864
	PA-10	20		3812.608
	PB- 2	21		4930.736

Division II

	RB-2	4	922.608	
	RD-1	5	672.512	
	RB-1	6	530.864	
	RC-1	7	494.176	
	RB-3	8	351.728	
	RD-3	9	351.536	
	RD-6	10	312.528	
	RC-3	11		276.416
	RD-7	12		378.040
	RA-1	13		925.312

	Key	Rank	Points Credit	Points Debit
GROUP C	PC-20	5	905.008	
	PC-15	6	854.544	
	PC-26	7	781.728	
	PC-24	8	757.536	
	PB-16	9	697.136	
	PD- 5	10	601.152	
	PC-25	11	522.384	
	PC-10	12	478.944	
	PB-10	13	478.832	
	PC-17	14	381.072	
	PC- 9	15	374.286	
	PC- 6	16	304.288	
	PC-13	17	248.912	
	PC-19	18	234.144	
	PC-14	19	101.024	
	PD-11	20	47.840	
	PB- 9	21		1038.688
	PC- 7	22		1176.544
	PC-21	23		1298.464
	PC-22	24		1955.440
	PC-18	25		9382.448
GROUP D	PD-12	10	823.232	
	PC- 2	11	655.664	
	PD- 3	12	640.256	
	PD- 7	13	536.544	
	PC- 4	14	510.016	
	PD-23	15	223.840	
	PD-14	16		163.408
	PD-15	17		545.040
	PD-13	18		764.608
	PD- 1	19		838.864
	PD-10	20		1001.248
	PD- 4	21		1407.904
	PD-20	22		2051.984
	PD- 9	23		7152.624
	PD-21	24		15100.448

Withdrawn:—PC-5, PC-16.
No January report—PA-4, 12; PB-7.
No December or January report: PB-8.

◆ Import Committee Shows Good Record

Ten years ago, at the 46th annual convention of the American Paper and Pulp Association, there were discussions of the unfair competition in the American market of foreign made papers. Nine years ago, at the 47th annual convention, the Salesmen's Association of the Paper Industry adopted resolutions urging the formation of an organization to combat this unfair foreign competition by the utilization of all the resources of existing law. In 1933, at the 56th annual convention of the American Paper and Pulp Association, the

Name It —and We Have It

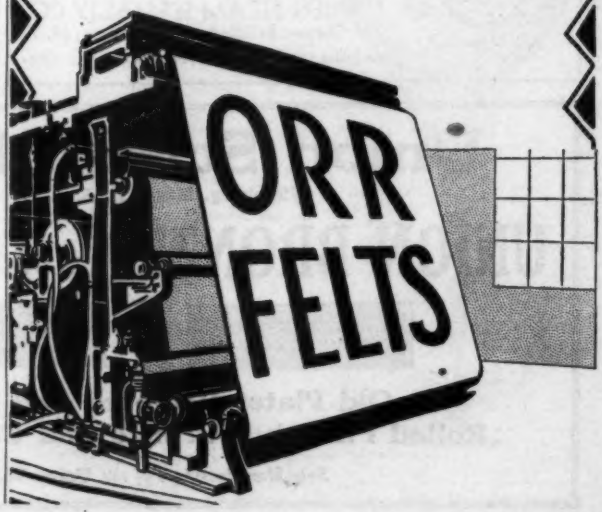
There are all kinds of paper mills and all kinds of paper machines in them. There are all sorts of operating conditions and all sorts of felting needs.

We weave fine felts with which to serve those many and varied felting requirements, and can send you a felt adapted to any condition you may describe.

Nor are we ever hesitant about placing Orrs in competition with other felts to determine which leads in water removal qualities, or in ability to stand hard wear.

Send your next felt order to Piqua.

The Orr Felt & Blanket Co.
Piqua, Ohio



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SAVES in power, 100% of entire investment first year.
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SAVES in chemicals, 75% of entire investment first year.
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These economies as well as many others are not theories.

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Import Committee of the American Paper Industry, the organization formed as a result of these efforts beginning ten years ago, can report that in the last nine years over $40,000,000 worth of paper, formerly bought abroad, has been diverted to the American mills.

The Import Committee of the American Paper Industry is proud of its record of accomplishment, for its activities have resulted in action in over 8,000 cases of separate importation, which were believed to involve under-valuation, misclassification or dumping of foreign papers. Thousands of these cases went to the United States Customs Court for trial, and court decisions upheld the contentions of the Import Committee in more than 80 per cent of all the cases tried in that court. Over 1,000 cases are still pending in the courts awaiting trial, involving importations at Atlantic Coast, Pacific Coast and Gulf Ports, as well as shipments to inland cities. During the year just closed, over 90 per cent of the cases decided by Government officials were adverse to the importing interests.

Of the cases now pending, the most important involve alleged violation of the Anti-Dumping Act as to Scandinavian sulphite and kraft wrapping papers, under-valuation or dumping of European glassine papers, but the thousand pending cases include papers of all grades.

The methods of the Import Committee are well known to the paper industry, and need only be explained by the statement that through this organization the paper industry has placed all of its technical, marketing and laboratory resources at the disposal of the Government, so that the officials of the Customs Bureau can have all possible assistance in their efforts to strictly enforce and construe the existing tariff laws.

Because the depression of business intensifies competition, it is in such periods as the present that the work of the Import Committee is most important, for it is at such times that the most strenuous efforts are made by foreign interests to supply the American market to the detriment of the American mills. To give the American mills an equal opportunity with the foreigners for the home market is the objective of the Import Committee.

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PAPER STARCH

For many years the reliable beater starch. Also STARCHES and GUMS of quality, with economy, for tub and calender sizing.

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BRONZE IRON STEEL
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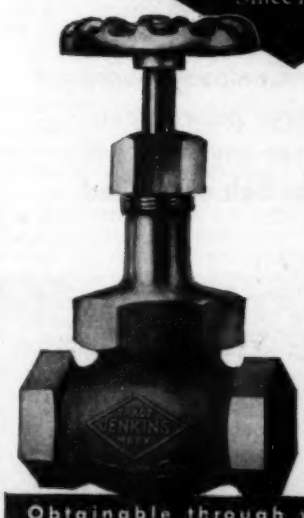
Since 1864



THERE is QUALITY in Fig. 106-A Jenkins Bronze Globe Valve—extra deep stuffing box—slip-on, stay-on disc holder — one-piece screw-over bonnet—Jenkins disc. It pays to insist on Jenkins Valves and the extra service that has characterized Jenkins quality since 1864.

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Fig. 106-A Globe, Screwed

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"Permits us to compete *successfully in present markets*"

BY providing a continuous chart record of beater roll movement during entire beating period, BRISTOL'S Motion Recorders are, in the words of the general manager of a New Jersey paper mill (name on request) "realizing incredible savings. They pay for themselves ten times a year. They permit us to compete successfully in present markets."

Note these added benefits:

Correct Fibre Length . . . Uniform Pulp Consistency
Stops spoiling of stock, banishes getting inferior grade of paper, prevents making paper of non-uniform strength and texture.

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Also enables mill to standardize beating methods.

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Model 911 BRISTOL'S Pulp Beater Motion Recorder

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Please send Bulletin 368-P on Pulp Beater Motion Recorder

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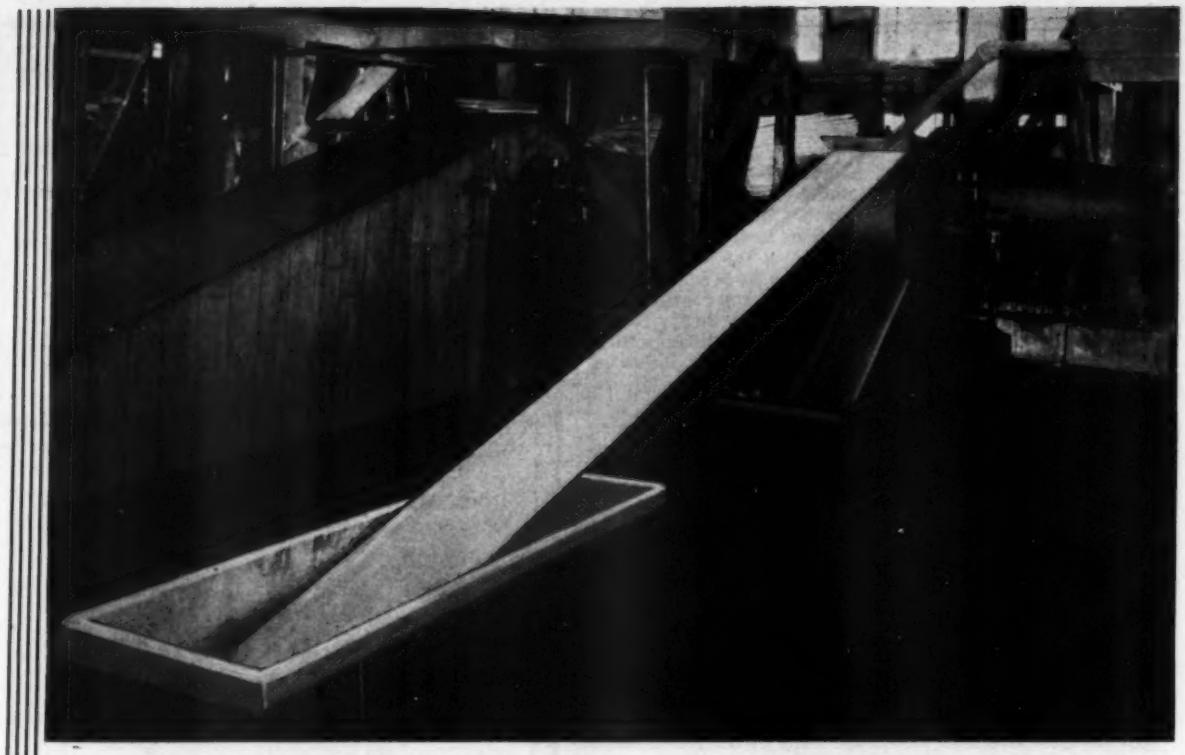


Illustration shows a CINCINNATI Belt (18" wide, 8 ply) on a Jordan Drive in The American Writing Paper plant at Holyoke, Mass. The belt transmits 180 horsepower and is operated at a speed of 2640 ft. per minute.

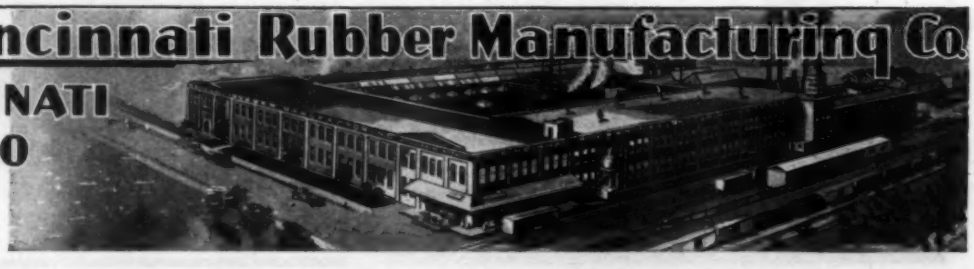
Leading Paper Mills *Depend* Upon CINCINNATI BELTS

Because of their scientific, sturdy construction, CINCINNATI Belts have unusual hug, no slippage, minimum stretch—advantages that assure *maximum power transmission, utmost economy, longest wear.*

That is why they are used by The American Writing Paper Company—why CINCINNATI Belts are depended upon by many of the large paper manufacturers throughout the country. Without any obligation, our engineers will analyze your power transmission problem and recommend the Belt best suited to your requirements.

The Cincinnati Rubber Manufacturing Co.

CINCINNATI OHIO



TECHNICAL DEVELOPMENTS

The following abstracts are of the latest developments found in the foreign press and in the patent offices. Photostats and translations of complete articles and patents can be obtained at cost price.

IN THE PAPER INDUSTRY ■ DOMESTIC AND FOREIGN

◆ Determining Hydrogen Ion Concentration in Liquors

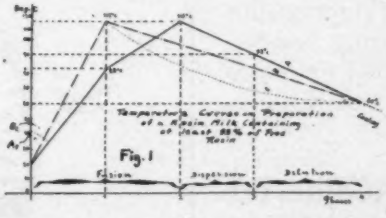
This refers to digestion liquor and bleach liquor. The pH value of sulphurous acid solutions, which are heated above 100 degrees C., approaches very closely the neutral point and is determined by conduction measurements at temperatures in excess of 150 degrees C. Hence, exceeding the neutral point is improbable. Inasmuch as the determination of the pH value on the basis of these measurements is not easy even for pure solutions and is practically impossible for a liquor which has been removed from the digester at an advanced stage of digestion, the conduction method must be considered as practical only for pure qualitative test. Hence, the possibility of using the potentiometric methods for the determination of the pH values of solutions, which contain free sulphur dioxide, was investigated. Due to the great reduction capacity of the sulphur dioxide, hydrogen, and antimony electrodes were found unsuitable, and the glass electrode was consequently selected for this purpose. The apparatus is described in detail in the original article. It was found suitable for determining the pH numbers at certain temperature covering the pH range of 1 to 10. It was found that the potential of the glass electrode in a solution of sulphurous acid is a linear function of the pH value of the solution. The same is true of the use of the glass electrode in the determination of the pH coefficient of bleach liquors at certain temperatures. S. Samuelsen and K. Haug. Papir Journalen, volume 19, pages 218ff.

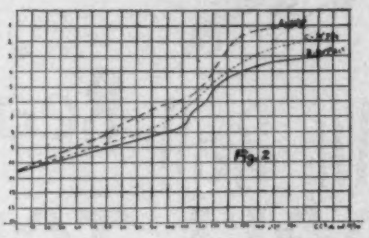
◆ Digestion Acid of High Sulphur Dioxide Content

The new process consists in passing the cold, crude digestion acid, which has been enriched with sulphur dioxide and which under certain conditions may be additionally enriched with the sulphur dioxide obtained from the heated crude digestion liquor, through a heat interchange apparatus. In this apparatus the cold acid is heated in the usual way by the hot waste gases and also by the hot digestion liquor from the digesters. The preheated liquor is fed to storage tanks from which it is withdrawn and further heated before being fed into the digester. When hot digestion acid, containing considerable sulphur dioxide is used in accordance with this process, considerably more sulphur dioxide is introduced into the apparatus than in the present process. The excess sulphur and the high temperature of the digestion acid accelerate the impregnation of the wood chips with the digestion liquor and make for more uniform digestion and finally make possible the existence of a high concentration of sulphur dioxide in the digester during all of the digestion process. The excess sulphur dioxide is removed from the digester according to the progress of digestion. This sulphur dioxide is fed into an absorption tower and a part of the sulphur dioxide is thereby absorbed by the cold digestion acid at ordinary pressure. The enriched acid is then fed under pressure into a preheater and finally stored under pressure in suitable tanks. Mo. och Domsjoe Aktiebolag Oeernskoeldsvik, Sweden. German Patent No. 556,002.

◆ Graphical Study of Sizing

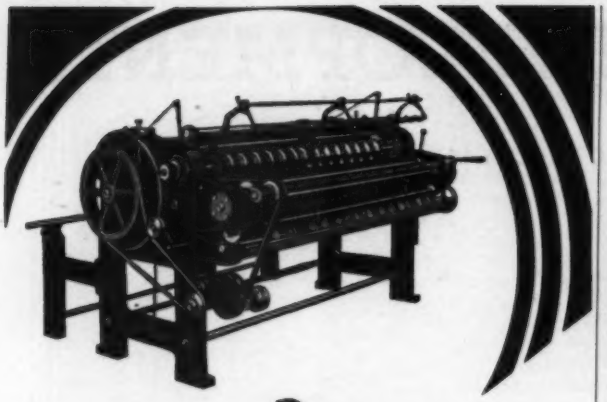
Two conditions can change the indispensable quantities of the rosin; namely, greatest possible degree of dispersion of the rosin and stability of the colloidal system from the preparation of the size to its use on the paper fibers. The effect of temperature on the particles of rosin in the size is shown in Figure 1. The angle (A_1) of the curve varies with the quantity of available heat and the effect of the insulation on the external walls of the apparatus in which the rosin is prepared. The ideal process would follow the direction of the curve (B) with the angle (B_1) as small as possible in order to avoid any carbonization of the rosin at the bottom of the apparatus, which would color the product a deeper yellow. When the rosin has been completely melted and the fusion temperature is in the neighborhood of 115 degrees C., dispersion starts with the addition of the colloid protector, which is likewise heated to 80 to 85 degrees C. The curve slopes down gradually and dispersion is complete around 90 to 92 degrees C. What is actually obtained in practice is the curve (C). The curve (B) is the limit which (C) should approach without having any convexity like (A), which represents the preparation of a dispersion under conditions which are most dangerous to its stability. Various other conditions and factors involved in the preparation of rosin sizes are also discussed graphically. A graphical study was also made of the neutralizing action of aluminum sulphate and sulphuric acid on hundredth normal sodium hydroxide. The reactions between rosin soap and aluminum sulphate, sodium sulphate and sulphuric acid are also studied. The results of the neutralization of 50 cc. of rosin size prepared from 30 per cent rosin soap and containing 10 grams of rosin per liter are shown in Figure 2. The curve (A) is for one-fiftieth normal sulphuric acid, curve (B) for same concentration aluminum sulphate and curve (C) for same concentration sodium sulphate. Rosin flakes appear at pH 6.5 for all concentrations. At the beginning, sulphate of alumina acts only on the alkaline combination of resinates and the curve proceeds smoothly from the isoelectric zone to pH 7.8. From pH 7.8 to 6.4, flakes of aluminum resinate form and peptization of the precipitate by the alkaline radicals which are still free. La Papeterie, 1932, pages 1106 to 113; 1158 to 1163; 1220 to 1229.





◆ Debarking Wood

Wood is debarked by a process which consists in softening the wood fibers and scraping off the bark and washing it away. The unbarked wood in the form of chips is first subjected to a softening treatment with alkaline reagents and thereafter the bark is scraped off. This results not only in a more rapid removal of the bark from the wood than is otherwise possible, but it also has the great advantage that the debarking process is no longer hindered by the difficulties that usually arise therein due more or less to the shape of the wood under treatment. Thus it is no longer necessary to cut out parts of the wood that have grown crookedly on the tree and it is also no longer necessary to employ debarking machines. Furthermore, it is also claimed that the material obtained from the new debarking process is better suited for processing. The alkaline chemicals, which are used in this new process, comprise principally solutions of caustic soda or sodium sulphite. Machines of the type of separators or rod mills, provided advantageously with light rods, are used for scraping the bark from the softened wood. In order



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to wash away the loosened bark, the wood chips are advisably carried on a perforated conveyor belt and washed with spray water. Deutsche Gold und Silber-Scheideanstalt, Frankfurt-am-Main, Germany. German Patent No. 553,334.

◆ Sulphite Digestion

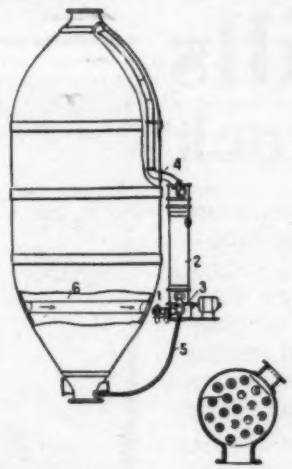
It is known that addition of oxidizing agents in the alkaline after-treatment of pulp as well as in the alkaline digestion of vegetable fibers exerts a favorable action. On the other hand, oxidizing agents, such as hydrogen peroxide, nitric acid and the like, have generally a harmful action in the acid sulphite digestion process. It is therefore striking that it has been found in sulphite digestion that the duration of the digestion can be reduced to a fraction of the usual time without injuring the product when oxygen or oxygen-containing gases are allowed to act on the wood during the progress of digestion. Dr. Walter Seidel and Dr. Rudolf Fingado, Leverkusen-Wiesdorf, Germany. German Patent No. 552,906.

◆ Chemical Processes in Sulphite Digestion

The literature on the subject is thoroughly reviewed. The authors were interested in studying and testing all the theories and investigations made. The testing apparatus and the methods used are also described. The wood was first analyzed to determine cellulose, lignin, pentosans, sulphur, ash, lime, resin. These tests were also made on the digestion liquor recovered. Furthermore, there were established the yield, the loss, the fluorescence phenomena, the pH values, the sulphur dioxide and easily splittable sulphur dioxide, the dry residue, sugar content and content of lignosulphonic acids (by precipitation with naphthylamine hydrochloride in the cold). As the digestion process proceeds, the whiteness of the pulp is enhanced. Hard pulps have the purest white color, notwithstanding the fact that they contain the highest proportion of lignin. The color is considerably improved by the increased content of free acid in the digestion liquor. The degree of fluorescence of the pulp increases and changes in color during the progress of digestion from violet to blue (very deep) and decreases again in color to violet. Fluorescence depends on the hardness of the pulp and on the proportion of sulphur dioxide that is easily split off. The color of the digestion liquor depends on a comparatively small part of the same and this portion is precipitatable in the cold with naphthylamine hydrochloride. The digestion process starts at a temperature of 110 degrees C. At the beginning, the content of sulphur in the pulp, as well as lime, rises, and then decreases, an indication of the formation of a solid lignosulphonic acid. The higher sulphur content was found at a temperature of 20 to 130 degrees C. after seven to eight hours digestion. The acid content decreased first from 100 degrees C. more rapidly and falls off toward the end of the digestion. The lignin content of the pulp decreases first from a temperature of 130 degrees C. The pulp at any time during the progress of its digestion contains the same quantity of cellulose as it did at the start. The sugar content of the waste liquors rises, notwithstanding, very rapidly, and therefore the sugar must be formed at the expense of the hemicellulose in the pulp. The dissolving out of the pantosans begin in earnest towards the close of the digestion. The formation of reducible sugar begins at a temperature of 110 to 120 degrees C. and the quantity formed depends on the sulphur dioxide concentration in the liquor. This is determined by analysis of the waste liquor. The resin content of the pulp is about half that of the original wood. Eljaschberg and Martinow. Contribution from All-Russian Institute for Cellulose and Paper. No. IV, page 5.

◆ Digester with Circulation Means

This digester is provided with means for circulating and heating the liquor externally, and is used in making sulphite pulp. In the apparatus shown in the accompanying illustration, the liquor is removed at the bottom of the digester (6). It is carried by means of the pump (3) into the heater (2) where it is reheated by means of steam which flows through the double walls of the heater so that the action is as rapid as possible. The liquor is then pumped into the top



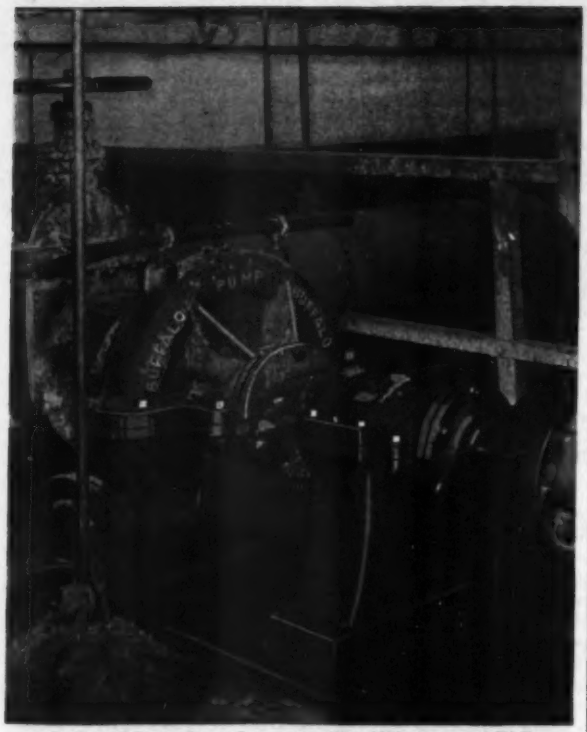
of the digester through the pipe (4), while a small portion of the liquor also falls down through the small pipe (5) into the bottom of the digester. The strength of digestion acid may be only four per cent. The pressure of steam used is 2.5 atmospheres and the temperature 140 degrees C. This should not be exceeded in the digestion process. The temperature of the digestion liquor rises within four hours to 105 degrees C. and after eight or nine hours to 125 degrees C. Admission of steam is then stopped, while the circulation of the liquor continues. The yield is 85 kilograms per cubic meter of wood cooked and the consumption of sulphur is eleven per cent. Forced circulation of the liquor results in more uniform digestion of the pulp. The temperature of digestion can be kept lower and hence the fibers of the digested pulp are longer and stronger. B. Skogstrom, Pappers Traevaru Tidskr. Finland, 1932, volume 14, pages 66 to 76.

◆ Economy of Ventilating Paper Machines

This is a very thorough discussion of the principles of ventilation of paper machines, the consumption of steam for producing the required energy for running the ventilating equipment and the general economy of the undertaking. The thermal details are worked out and the various economies resulting from ventilation are discussed under the headings, increased production from the papermaking machine, reduction in cost as regards the drying felts, and these savings are balanced against the increased consumption of steam for power in operating the equipment. Examples are worked out numerically in detail. Economy can be obtained only by proper design and proportioning of the ventilating equipment as regards the quantity of heat and air and also the choice of the equipment which must be suited to the conditions under which the paper machine operates. The success of ventilation depends first on the correct temperature of the warm air which must be at least 90 degrees C. in the case of paper machines wherein felts are used. The air must be distributed from bottom to top in such a manner that a brisk current of air passes through the machine and the air in the lower part of the machine, where the heating action of the free heating surfaces is not manifested, is well preheated. The quantity of heat and of air must be proportioned to the evaporating action which takes place in the separate groups of drying cylinders. The distribution and the number of the air inlets must be adjusted to conditions. The air must contact the various surfaces, at which evaporation takes place, at a maximum temperature. In order that as much warm air as possible should contact with the felt or rather should enter it, the air-blast pipes are arranged as close as possible to the felt. The air heater must be suitably located with the avoidance of large pressure and temperature losses. The air heater and the ventilating fan must operate at high efficiency. The ventilating installation must be adjustable to external atmospheric conditions as well as operating conditions in the paper making machine, such as changes in required heat consumption in the machine due to increased load. Dr. Richard Noethlichs, Wochenblatt fuer Papierfabrikation, 1932, volume 63, pages 874 to 877 and 936 to 939.

◆ Manufacture of Wood Pulp

The new process is concerned with the manufacture of chemical wood pulp from wood chips by a discontinuous process with the aid of the known digestion liquors in a digester which is provided with a stirring apparatus which causes disintegration of the fiber bundles during the digestion. The feature of the process is that the wood is previously



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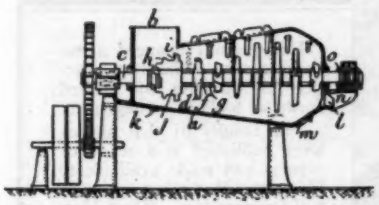
cooked until the fiber bundles are loosened up and then the remainder of the disintegration is effected by the agitating equipment in the cooker. Experiments have shown that agitation must not be started before a certain degree of decomposition of the wood chips has taken place. If the disintegrating treatment is effected before this has taken place, then a part of the fibers will separate before the rest and will be overcooked and softened, while the remainder of the fibers will be under-cooked. In other words, the pulp obtained will not be uniform in composition. Too early agitation and disintegration of the wood fibers also causes mechanically-injured fibers and slow pulp. The agitation of the wood chips is therefore not begun at the beginning of digestion, but this is considered a separate stage of the digestion process, and it is commenced only when the digestion caused by the chemical action of the digestion liquor has gone far enough in disintegrating the wood so that the fibers are easily separated from their bundles. Patentaktiebolaget Groendal-Ramen, Stockholm, Sweden. German Patent No. 553,996.

◆ Disintegrating Machine for Paper Pulp

This apparatus consists of a conical shell (a) in which is located a shaft provided with arms or rotating paddles and an endless conveyor. This is located adjacent to or inside the feeding hopper, so that the feed of material into the disintegrating machine is continuous. The



feed hopper is shown at (b). Water or other liquor is allowed to enter the apparatus through the inlet located at (k) and is removed through the outlet at (l). Between the paddles (f) which are fastened to the shaft (c) there are arranged tubes (g) which prevent the accumulation of substances. W. C. Fraser. British Patent No. 364,422, filed March 9, 1931.

◆ Decomposing Wood With Nitric Acid

If wood is decomposed by boiling with the most suitable concentration, seven per cent, of nitric acid, the consumption of acid, after allowing for the recovery of nitrous oxide, is twenty-five per cent of the dry weight of wood, but by slight modifications of procedure and recovery of ammonia and hydrocyanic acid this is reduced to from twelve to fifteen per cent. The yield of cellulose is 45 to 49 per cent and its quality reasonably good. It has a copper number of approximately 1 (Schwalbe) and contains 90 per cent alpha-cellulose and ten per cent of pentosans. The consumption of nitric acid is mainly due to oxidation of lignin. Carbon monoxide, carbon dioxide, hydrocyanic acid, acetic acid and oxalic acid are formed, the proportion being one-third of the entire quantity, as well as products of higher molecular weight, the proportion being two-thirds of the entire quantity. The pentosans are mainly hydrolyzed without consumption of nitric acid. A. Schaarschmidt and P. Nowak. Cellulosechemie, 1932, volume 13, pages 143 to 149.

◆ Caustisizing Sulphate Liquor

The effect of sodium sulphide on the yield obtained in the causticizing process carried out on liquor containing varying content of sodium sulphide and excess of lime has been examined. Sodium hydroxide is formed not only by the causticization of sodium carbonate, but also by the hydrolytic splitting of sodium sulphide. However the latter is not completely hydrolyzed in the two stages of hydrolysis. The hydrolysis of sodium sulphide lies so-to-speak between the first and the second stage. Furthermore, the yield of the causticization with varying quantity of lime was also determined. As the addition of lime increases, the causticity rises rapidly at the beginning, then less strongly, nevertheless with constant, impaired utilization of the lime at higher degree of causticity. The effective consumption of the lime, therefore, decreases rapidly in the experiments on obtaining the maximum yield in the process. The concentration of the lye and the degree of causticity have a marked effect on the cost of the strong liquor produced. In order to attain economical causticization in practice, the addition of the soda solution should vary as little as possible, since under these conditions it is possible to calculate once for always the most economically favorable quantity of lime that must be added. On the other hand the sodium sulphide content is difficult to maintain at a constant point, because it is affected by the quantity of sodium sulphate that is required at any time. It is best practice to analyze each individual digestion liquor to determine the extent of causticization required. The correct quantity of lime that must be added to attain the desired result may be obtained from standard tables. The experiments showed that a most favorable causticity is approximately 87 per cent (with a total alkali content of 110 to 115 grams of sodium oxide per liter). This percentage is nevertheless dependent on the sodium sulphide content of the liquor, on the local prices of lime, sodium sulphate and on the cost of evaporation. Th. Overwien. Papir Journalen, volume 19, pages 244ff.

◆ Fuel in Sulphate Mills

A study was made of the effect of four different digestion processes, as far as the fuel problem in the mill is concerned. The four digestion methods investigated were digestion in a rotary digester with direct steam heating, vertical digester with direct steam heating, vertical digester with indirect steam heating, preheating the digestion liquor and forced circulation of the same, and finally vertical digester with indirect steam heating, simultaneous concentration of the digestion liquor and forced circulation of the same. The recovery of black liquor and its use for fuel purposes were particularly studied. It claimed that a certain Swedish pulp mill by careful attention to thermal and other technical details in the sulphate pulp process was able to reduce its total consumption of coal by 75 kilograms per ton of the air-dried pulp. A. Nielsen. Svensk Papp. Tidn., 1932, volume 35, pages 45ff.

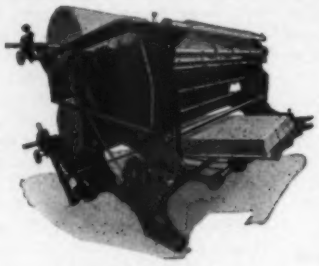
◆ Coloring Paper Pulp

The illustration shows the arrangement of the various parts of an installation which is claimed to give high production. It is composed of a number of tanks or vats. The first is a washing tank (V) and the second a dyeing tank (U) in which the paper pulp is also washed. A small draining box provided

with a perforated bottom is interposed between (V) and (U), while a second box (K) is provided for the purpose of removing the greatest part of the water contained in the pulp, this being accomplished with the aid of the centrifugal pump (P). The pulp is then removed into the cart (R). There are two compartments (A) and (B) with semicircular bottom in the vat (V). The dimensions of the vat (V) are regulated according to the quantity of pulp washed, the quantity of water available for washing and the rate of flow of the pulp. Two agitators are located in (A) and (B) and revolve at the same speed. Suitable inlets for water are provided. The small box (C) has two low side walls. The very wet pulp is pushed over the double perforated bottom and arrives into the tank (U). This tank is very long and is divided into four compartments (D), (E), (F) and (G) in which the pulp is colored. The final compartment (H) is provided with a paddle agitator for washing the colored pulp. Arangements are made for moving the pulp from one compartment to the other. The pulp finally passes through the box (K) where a great deal of the water is removed from it. R. Sansone. La Papexterie, volume 54, pages 1049 to 1053.

◆ Sulphite Pulp

An improvement has been effected in the sulphite process in that the causes of abnormal cooking are overcome. In this process the waste sulphite liquor is used in the digestion. The wood is accordingly digested in two stages. In the first stage the wood is impregnated with a fresh, alkali bi-sulphite liquor, to which no additional sulphur dioxide has been added. After the excess liquor has been removed from the wood, the latter is digested with a liquor which consists of waste liquor or wash water obtained from a previous digestion, and which contains the total quantity of free sulphur dioxide which is required for the



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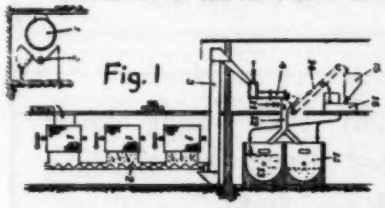
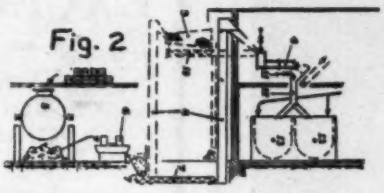
digestion of the wood. The result is that acid hydrolysis takes place in one stage and thus the carbohydrates are split off from the lignin in this part of the process, where the lignin absorbs so much alkali bisulphite, that free lignosulphonic acids can no longer be formed, but in their stead lignosulphonic acid salts. Due to the fact that the wood fibers have already absorbed, the alkali bisulphite liquor, the time which is necessary for the acid hydrolysis of the wood is shorter, and the fibers are exposed considerably less to the acid digestion liquor. The result is that the conversion of the liberated carbohydrates into sugar or into any other soluble compound is avoided. The presence of the alkali sulphite also reduces the concentration of the hydrogen ions in the digestion liquor, and this has the consequence of reducing the harmful action of the digestion liquor on the liberated carbohydrates. Patentaktiebolaget Grondal-Ramen, Stockholm, Sweden. German Patent No. 554,826.

◆ Reworking Old Paper

Old paper, sorted or unsorted, is worked up into a homogenous pulp. Various apparatus are provided and one type is shown in the accompanying illustration, Figure 1. The old paper is introduced into the perforated, macerating drums (1) in which the slightly moistened material is disintegrated by the rotation of the drums, whose walls retain



the foreign substances while the disintegrated mass falls through the perforations in the walls of the drums on to the helical conveyor (2). This conveyor carries the more or less disintegrated material—depending on the size of the perforations in the walls of the drums—either to a mill and then to an elevator, or directly to the elevator (3), which carries the material to a disintegrating apparatus (4). This apparatus reduces the material to the state of fine fibers without however shortening them, no matter how the raw material may be composed, containing either old paper, cardboard, paper waste, etc. The impurities both of lower and higher specific gravity than the paper fibers are not affected by the operation of the apparatus (4) and are ejected periodically at the same time that the disintegrated fibers are removed through the outlet in the apparatus (4). Another arrangement of apparatus is shown in Figure 2. The raw material, sorted or unsorted, is placed in the digester (5) from which it is taken up by the cylinders (6) which feed it to the screw conveyor (7) and the elevator (8) directly into the drum (9) whose walls are made with large openings, or by means of the conveyor (10), in which case the drum (9) is not used, directly to the disintegrating apparatus (4). The purified material is then carried from (4) into the vats (13)



through the gravity feed (12), while water is added through (11). The stock is then removed to a beater, wherein it is treated and made into condition ready for manufacture into paper or paperboard. A. Kuhn and K. Kuhn, Czechoslovakia. French Patent No. 734,887.

◆ Formation of the Sheet and Its Strength

The chemical constants of beaten and unbeaten pulp are the same. The beating of pulp in the beater or the like is nothing more than a fine division of the fibers, which is carried out in such a manner, that the external surface area of the fibers is increased at the expense of the internal surface area. The available external surface area determined in a mixture of fibers—the chemical properties of the pulp are assumed to remain constant—establish the strength characteristics of the paper. The assumption of a capillary-chemical phenomenon is substantiated. The cellulose fibers are of crystalline character and are composed of elementary cells. The fibers are composed of several layers of small fibrillae of sub-microscopic magnitude, and these are wound around spirally a common axis. The surface of the fibrillae consisting of elementary cells is the location of the force which binds them together. In the ordinary aqueous suspension the fibers absorb the water and become plastic. The strong dilution of the stock on the wire keeps the fibers so far apart that the force which acts to form them into a latticed structure can manifest itself. Their electric charge push the individual fibers away from one another. The dehydration on the wire brings the fibers together only in insufficient degree. It is only in the presses that the fibers of the web are brought together more or less densely, so that the distance between the fibers is less than the radius of activity and the force felting the fibers together can manifest itself. The fibers are still plastic and the felting force is still unoriented. The fibers become more solid on drying. Kaare Haug. Papir Journalen, volume 20, 1932, pages 69ff.

◆ Overcoming Resin Difficulties

Various factors, which influence the ease of removal of resins from wood include change in concentration of pH ions, change in temperature and chemical composition of the factory water, and cooling the pulp still containing hot digestion liquor with cold water. If the chips of fresh wood are aerated for a short time and the resins in the wood are therefore combined with oxygen, it is posible to obtain wood which is free from resins, just like wood that has been stored for several months to accomplish the same purpose. Oest. Zentralblatt fuer die Papierindustrie, volume 49, pages 432 to 434.

◆ Cooking Pulp

The fibrous mass is digested in vertical digesters, which are heated directly or indirectly. The digestion liquor is circulated in the lower part of the digesters by means of circulating apparatus located externally of the digester. The gas, which effects the digestion of the wood, is introduced into the liquor while it is circulating. Special equipment is provided for circulating the liquor and introducing the gas, such as sulphur dioxide. Aktiebolaget A. Ekstroems Maskinaffaer, Stockholm, Sweden. Austrian Patent No. 126,794.

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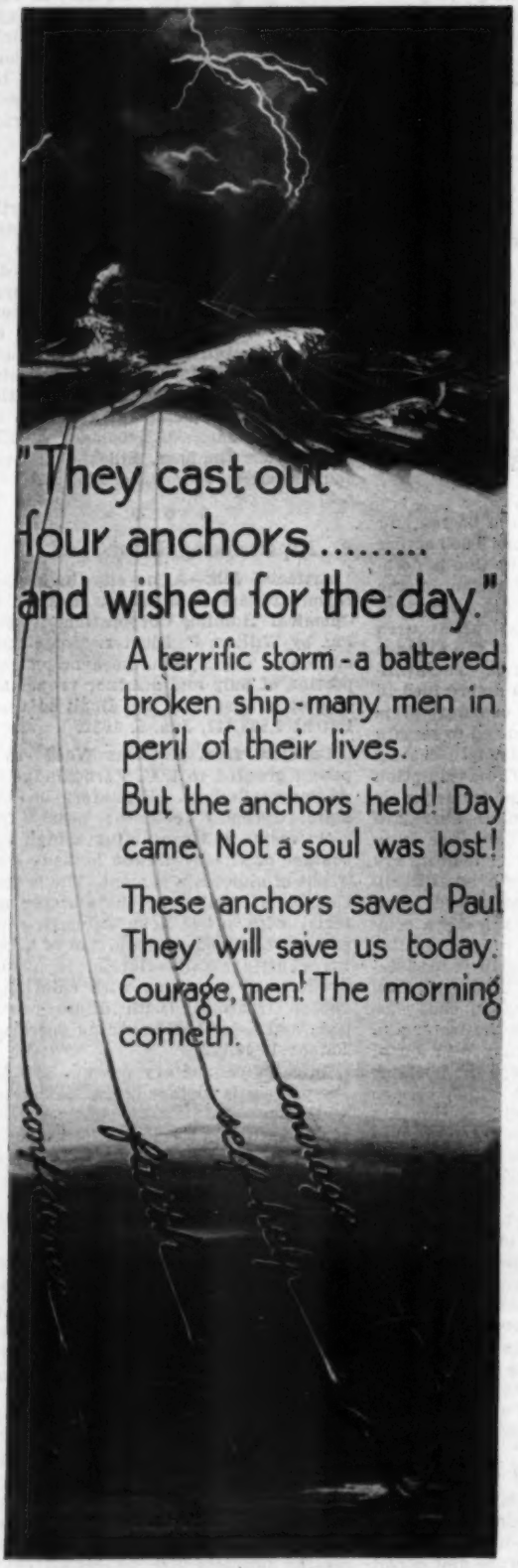
◆ Papermaking Inventions

Artificial Silk—A novelty in viscose rayon appears in a patent assigned to Chemical Holding Corporation, Apollo, Pa., by William F. Richter. In the formation of alkali cellulose a major proportion of pulp and a minor proportion of cotton dust with an alkali is used. Patent 1,839,411, Jan. 5, 1932.

Cellulose from Resinous Wood—In a patent granted to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany, cellulose nearly free from resins and containing a high percentage of alpha cellulose is made from woods of high resin content. The process comprises opening up the starting material with nitric acid, subjecting the product obtained to the action of a boiling caustic alkali solution, then to a preliminary bleaching with chlorine, a second treatment with dilute caustic soda and a further bleaching operation. Patent 1,840,162.

In a supplementary patent, 1,840,198, the process is further described as steps which consist in impregnating the material with nitric acid, withdrawing excess acid and allowing the impregnated material to stand until a sample is disintegrated completely when boiled at ordinary pressure for thirty to sixty minutes with an aqueous solution of caustic soda of about 2 per cent strength.

Sulphite Digester—Ralph H. McKee, Jersey City, N. J., is the patentee of a steel digester for cooking sulphite pulp, the specifications naming a steel alloy having a low carbon, phosphorous and sulphur content. The chief claim is for the incorporation as an alloy with the steel of a metal having the properties of chromium in the proportion of 15 to 20 per cent, and nickel in the proportion of 7.5 to 10 per cent. Such a digester is said to be capable of resisting the corrosive action of sulphite liquor as well as the physical stresses caused by the thermal and pressure conditions in sulphite cooking. Patent 1,841,752, Jan. 19, 1932.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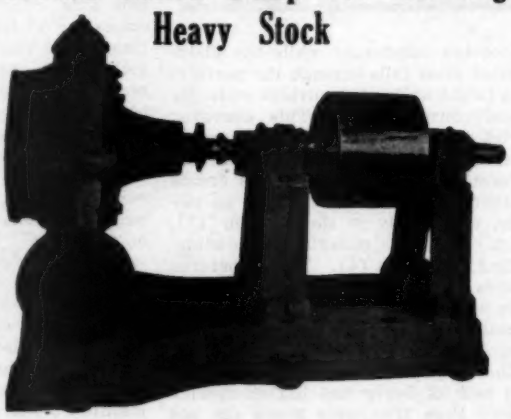

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The COMMERCIAL OUTLOOK

New York, March 1, 1933.

FROM just about every material or practical viewpoint, the paper market has failed to register any improvement whatever in recent weeks. If anything, the situation existing within the industry has grown worse, influenced as it has been by most unfavorable conditions outside the bounds of the paper industry generally and among consumers and converters of paper specifically as well as by circumstances prevailing within the industry. Demand for paper of all kinds has developed in restricted volume; buying incentive has been dampened to no little degree and buyers almost without exception have confined their operations in the market to covering bare requirements, and their requirements have fallen far short of anything even so much as approaching normal. Paper and board manufacturers have found it necessary to further curtail mill operations; in fact, some of the reports that have been heard concerning individual mills say that manufacturing activities have been reduced drastically; in quite a few instances, it is stated, mills have run only a day or a couple of days per week. The scope of the market has been so narrowed that manufacturers have been occasioned much difficulty disposing of even the small tonnages of their product produced, and, as usually is the case under such conditions, price has been a secondary consideration to the securing of orders, and market price levels have undergone additional recession.

Despite this doleful situation from a business standpoint, sentiment within the industry has improved. There seems no doubt of the accuracy of this assertion. On all sides are heard expressions of optimism that the worst has been seen, that better market conditions—larger demand, more readiness to buy, a steadier price position—are ahead; that underneath the surface of the distressing situation during the last several months a better feeling has developed, and that paper manufacturers along with the country's other manufacturers are destined to experience less difficult conditions in the near future. It is common belief that the new administration in Washington will exert every effort to bring about relief, and that these efforts will bear fruit; it can be said that the business fraternity of the nation is getting solidly behind the new political regime and that this solidification of sentiment will in itself help to bring industry out of the depths to which it has sunk.

Moreover, as regards the paper industry specifically, it is felt that the conferences and discussions of paper manufacturers at their annual convention in New York last month will have reflection in improved conditions within the industry. Constructive work was done at the convention, according to all intimations; by way of illustration may be mentioned the getting together of groups of manufacturers who previously had refrained from group co-operation, and also the great emphasis put on the foolhardiness of further price reductions on paper and paper products.

Meanwhile paper manufacturers are striving to do what they can toward creating some degree of stabilization in their markets. Not alone is production being gauged in accordance with the demand current, thereby diminishing the surplus supply of paper on the market, but many paper manufacturers are flatly opposing any additional downtrend in market values by refusing to sell their product at cheaper prices. In some divisions of the industry a steadier price tone is seen, and in others there has been at least a checking of the downslide in prices.

Production of paper of all classes in the United States during the calendar year 1932 is authoritatively estimated at approximately 8,000,000 net tons. This was not so poor a showing compared with many other manufacturing industries. The 1931 total output was 9,381,850 tons, according to the American Paper and Pulp Association, so that the decrease last year from the year before was only about 15 per cent. The maximum production of paper in this country in any single year was in the vicinity of 11,500,000 tons, and last year's output therefore was only about 30 per cent down from the top point. It is questionable whether any other basic manufacturing industry in the country can boast of so favorable a showing from a production standpoint.

The output of newsprint paper in the United States during January amounted to 74,444 net tons, compared with 80,075 tons in the preceding month and 94,247 tons in the similar month last year, while Canadian production was 140,139 tons in January, against 138,682 tons in December and 171,321 tons in January a year ago, according to the monthly summary of the News Print Service Bureau. Shipments from Canadian mills in January were 133,056 tons, contrasted with 138,682 tons in December and 171,843 tons in January, 1931, and from United States and Canadian mills, 205,781 tons, against 219,772 tons in December and 266,393 tons in January last year. Stocks of newsprint at Canadian mills on January 31 were 49,837 tons, against 42,337 tons a month before and 53,683 tons on the same date a year ago. Stocks at United States and Canadian mills were 73,339 tons on January 31, compared with 64,137 tons on December 31 last and 86,089 tons a year ago.

Production of boxboard in the United States during the last calendar year totaled 2,152,045 net tons, compared with 2,556,851 tons produced in 1931, and 2,699,595 tons in 1930, according to statistics compiled by the U. S. Bureau of the Census. Board output last year was 55.1 per cent of mills' rated capacity, against 65.9 per cent in the preceding year and 68.9 per cent in 1930. Shipments of board from mills aggregated 2,160,093 tons during 1932, or in excess of the year's production, contrasted with 2,544,301 tons in 1931 and 2,692,498 tons in 1930, while new orders received by mills called for a total of 2,148,991 tons last year, against 2,527,024 tons in 1931, and 2,685,373 tons in 1930. Unfilled orders held by manufacturers at the end of December last were for 33,490 tons, compared with 33,575 tons a month before, and 36,345 tons on the same date a year ago, while stocks of board at mills at the end of December amounted to 76,173 tons, contrasted with 72,491 tons a month before, and 85,001 tons at the end of 1931. Board mills consumed a total of 2,151,194 net tons of waste paper during 1932, against 2,391,368 tons in 1931 and 2,572,445 tons in 1930. Stocks on hand at the end of last year were 184,970 tons, compared with 200,953 tons at the close of 1931.

The jigsaw craze has been a development of prime importance to board manufacturers, the popularity of this novelty having provided a market for a huge amount of boxboard. An authority in the trade is sponsor for the statement that the consumption of board in this connection has enabled many board mills to operate in recent months two days more a week than they probably would have had it not been for this consuming outlet. Board prices are well maintained in the East at $30 per ton for filled news and $27.50 for plain chip board delivered in New York City. Newsprint prices remain unsettled and reports tell of some under-selling going on in certain parts of the market. Consumption of print paper continues appreciably below what can be called normal volume. Fine paper prices exhibit a steadier tone and manufacturers in frequent instances are said to be refusing to make further reductions. Tissues are quiet and irregularly quoted; book paper tends toward a steadier price position, while wrapping paper is still more or less a problem from a quotable standpoint.

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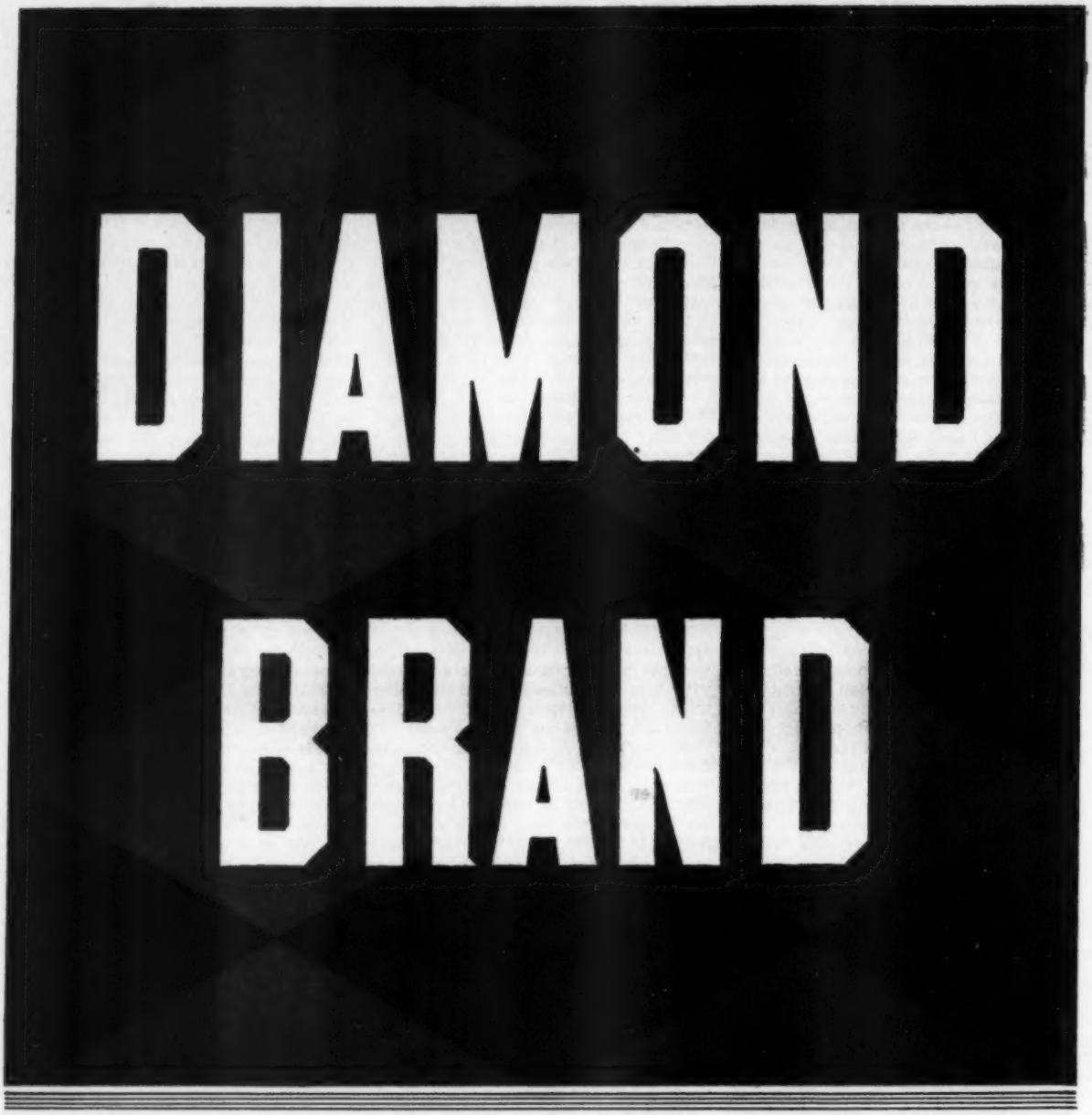
◆ IT IS ANNOUNCED that on account of the present economic conditions, there will be no meeting this year of the Fox River Valley and Lake Shore Safety Council. It is hoped that these annual meetings which have drawn a large attendance from Wisconsin industrial executives and safety enthusiasts will be resumed in 1934.



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◆ Papermaking Rags

Paper manufacturers continue to evince very little interest in rag stock and are absorbing supplies in distinctly restricted fashion. The market, in fact, is equally as quiet as it has been for some months past, and the limited buying being engaged in by mills has almost no influence on the price situation—certainly it is not aiding market values from the standpoint of those having rags for sale. There is considerable talk within the trade regarding the bullish supply condition existing in rags for papermaking, and there appears every reason to believe that most grades of cotton rags suitable for paper mills are in anything but plentiful available supply, if not held by dealers in subnormally small amounts, with production and collections at a low ebb and adding little tonnage to the stocks of rag merchants, yet the supply situation has scant bearing on the market while demand from consumers is as narrow as it happens to be and has been in recent months. In short, papermakers are succeeding in getting the small quantities of rags which they require—and purchases are being confined almost exclusively to definite requirements—at no advancement in costs, or at almost any price so long as they are willing to make bids within reasonable bounds.

Most of the slight buying is still concentrated on the highest and lowest grades of papermaking rags, which is to say the better qualities of new cotton cuttings and the cheapest class of old cotton rags or roofing stock. The descriptions in between these two classifications are dull indeed; it is declared in numerous quarters of the trade that sales of many kinds of rags which formerly found much favor among paper mills are well nigh impossible at present, since manufacturers show virtually no desire for such material. New No. 1 white shirt cuttings are reported bringing in the vicinity of 4 cents per pound delivered mills, with the probability that consumers are effecting some purchases at a little under this price or about 3.75 cents, while new unbleached muslins are on a price level of 4.50 cents a pound f.o.b. dealers' shipping points, light silesias 3.25 cents, new blue overall and cheviot cuttings 3 cents, new khaki cuttings 3.50 cents, light flannelettes 3.50 cents, and fancy shirt cuttings 1.50 cents. A development of prime interest in new cotton cuttings is that sales of some of these rags have been made for export to Europe, white shirt cuttings and washables being among the grades mentioned as having been shipped from here to consumers across the Atlantic.

Old white cottons are neglected by paper mills, as are thirds and blues, and prices of these rags are principally nominal at approximately 2.50 cents a pound at dealers' points for No. 1 repacked whites, 1.75 cents for No. 2 repacked whites, and 90 cents to $1 per hundred pounds for repacked blues. Eastern mills are securing No. 1 classification roofing rags at 45 cents per hundred pounds at shipping points, and No. 2 roofing stock at 35 cents f.o.b. dealers' points. Demand for roofing rags is moderately good and shows some tendency to increase; dealers assert that practically all the supply reaching the market is finding a ready sales outlet among roofing paper mills.

◆ Rope and Bagging

Little else than routine movement of old rope and bagging to paper mills is noted, yet now and then buyers come into view for fair-sized amounts of these materials and there seems ample buying to sustain market values. No. 1 domestic old manila rope is selling at 1.50 cents a pound f.o.b. shipping points with prices ranging a bit above and below this level, while foreign old manila rope is fetching around 1.40 cents ex dock U. S. Atlantic ports. Old strings and offgrades of old rope are little wanted though reports tell of a fair call from certain quarters for sisal strings. Consumers are paying in the vicinity of 70 cents per hundred pounds at shipping points for No. 1 scrap bagging but it is said well above this price has been granted in cases where extra quality bagging has been involved.

◆ Chemicals

Contract supplies of papermaking chemicals are moving freely but there is limited demand developing in the market currently. No changes of importance are reported in quoted rates. Soda ash is 1.30 cents a pound at works for carlot shipments in bags; caustic soda, 2.55 cents for the solid product; bleaching powder, 1.75 cents; gum rosin, 3.60 cents, and casein, 7 to 8 cents.

◆ Old Paper

Some descriptions of waste paper are stiffening in price as a result of a tightening of available supplies and a disposition among consuming mills to increase their takings of stock, since they presumably are coming to realize that the market is not by any means oversupplied with such raw material. Oddly enough perhaps, it is the highest and the lowest grades in smallest supply and exhibiting the strongest price trend. Folded news and No. 1 mixed paper have advanced in the eastern market to where mills are paying 35 cents per hundred pounds f.o.b shipping points for old newspapers and 20 cents for mixed paper, while substantially higher prices than these prevail in the Middle West, western mills granting 50 cents for folded news and 35 cents for mixed paper. Eastern shippers are demanding 1.90 cents and higher per pound for No. 1 hard white envelope cuttings, around 1.75 cents for No. 1 hard white shavings, and 1.50 cents for soft white shavings and 1.70 cents for extra quality packing of soft shavings. Old books and magazines are bringing 50 cents a hundred pounds f.o.b. eastern points, ordinary ledger stock 50 cents, and No. 1 old kraft paper 60 cents. Dealers are expecting increased consumption of waste paper as the spring draws on, and insist that unless larger supplies become available, higher market prices will be seen.

◆ Mechanical Pulp

There is, of course, a regular movement of mechanical wood pulp from domestic producing plants into consuming channels, but it is almost entirely against contracts, and current business in the commodity in the open market is of scant consequence. Numerous users are obtaining a good portion of their required tonnage of groundwood from abroad; that is, from Scandinavian sources. Domestic and Canadian producers are eager for orders and are not refraining in some instances to allow price concessions to rid themselves of pulp, with the obvious result prices are in an easy position. Canadian grinders are said to be selling prime groundwood in certain cases at as low as $13 and $14 per short ton f.o.b. pulp mills across the border. Most producers in the United States are quoting around $18 a ton at producing points, though prices, as usual, depend largely on the haul to consuming centers and also on the air dry test. The market, from a selling viewpoint, provides few or no satisfying features notwithstanding that producers are doing what they can to keep the output of groundwood down to approximately the market's needs.

◆ Chemical Pulp

The market for chemical wood pulp has ruled decidedly quiet in recent weeks. Paper and board manufacturers have displayed little disposition to buy other than in exceptional cases or when obliged by necessity, and there has been less inclination to acquire supplies of domestic pulp than pulp of foreign origin, the evident reason for this being that apprehension that some form of import duty might be imposed on chemical pulp has caused consumers in certain instances to augment their stocks of the imported article. Despite the quiet condition of the market, prices of chemical pulps have held quite steady and sellers have not pressed offerings upon consuming customers. Domestic prime bleached sulphite, more particularly West Coast sulphite brought around to the Atlantic seaboard by steamers, is quoted at 2 to 2.10 cents a pound ex dock New York or other Atlantic ports. Some bleached sulphites have been reported available at 1.90 cents, and somewhat less. Unbleached sulphite of domestic origin is around 1.50 cents f.o.b. pulp mills, and domestic kraft 1.25 to 1.75 cents, according to quality, while bleached soda pulp is 2 cents per pound delivered book paper mills.

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Import and Export MARKETS

IMPORTS

◆ Wood Pulp

Importations of chemical wood pulp into the United States during the calendar year 1932 totaled 1,154,907 long tons of all grades, valued at $43,652,916, showing a decrease of not quite 7 per cent in quantity from the 1,237,600 long tons of a declared value of $56,409,638 imported in 1931, and a larger decline contrasted with 1,369,327 long tons of a value of $74,140,504 in 1930, according to official statistics compiled by the U. S. Department of Commerce. These figures show that while the tonnage of imports last year held up comparatively well with that during 1931, the value of the pulp imported last year dropped sharply, the total value of last year's importations being some 23 per cent below the value of the preceding year's receipts.

Chemical pulp imports last year comprised 311,046 long tons of bleached sulphite, valued at $14,727,214, compared with 319,518 long tons of a value of $18,887,719 in 1931; 508,088 long tons of unbleached sulphite of a value of $17,047,669, against 540,478 tons of a value of $23,033,069 in the year preceding, and 310,650 long tons of unbleached sulphate or kraft pulp of a value of $9,818,674, against 344,612 tons of a value of $12,035,030 in 1931. There also were 23,366 long tons of bleached sulphate pulp of a value of $1,975,720, and 1,569 tons of soda pulp of a value of $65,512 imported during 1932.

Mechanical wood pulp imports into this country last year amounted to 168,272 long tons, valued at $3,268,457, compared with 188,086 long tons of a value of $4,498,022 in the preceding year, and 267,193 long tons of a value of $7,146,290 in 1930, according to official Government figures. The 1932 mechanical pulp imports registered a decline of 10 per cent in quantity and 27 per cent in value contrasted to the preceding year's importations.

The decrease in pulp imports into the United States in 1932 represented a continuance of the decline which set in during 1930, following the year of record-breaking chemical pulp imports in 1929, and thus last year constituted the third successive year of decline. During 1929, total chemical pulp imports into this country reached 1,441,110 long tons, valued at $82,840,220. The 1932 imports of chemical pulp therefore were not quite 20 per cent below the record receipts during 1929 as concerns quantity, and showed a decrease in value amounting to 47 per cent. In tonnage, the 1932 imports of chemical pulp were the smallest in any year since 1924, while the groundwood imports last year were below the total in any year since 1922.

The market for imported wood pulp rules rather quiet. There is little disposition manifested at present by paper and board manufacturers to purchase pulp other than to cover actual requirements, and it is no secret that most consumers have their needs amply provided for with stocks on hand or pulp on order, especially at their prevailing rate of curtailed consumption. During the past month there have been spotty indications of market activity. Some mill buyers have come into evidence at intervals and absorbed fair-sized lots of pulp, not only for forward shipment from abroad but also from spot stocks held on the docks or in warehouses at American Atlantic ports. There have been instances where consumers, apparently apprehensive of the imposition of some form of import duty on pulp, have bought spot pulp from surplus or consigned stocks with a view to owning substantial amounts of raw material in the event of a tariff on the commodity.

Prices of chemical pulp give every sign of stability. Sellers are adhering quite firmly to the basic quotations established by producers, and are demanding 2 to 2.10 cents a pound ex dock American Atlantic ports for prime kraft pulp. It is likely some pulps of secondary or half-prime qualities are to bleached sulphite, 1.50 to 1.60 cents for prime unbleached strong sulphite, and 1.25 cents for prime kraft pulp. It is likely some pulps of secondary or half-prime qualities are to be had at slightly below these figures, but importers and agents are reported little disposed to grant concessions on strictly prime grades.

◆ Paper

Imports of paper and paper products into the United States recorded a sharp decrease in value during 1932, reaching a total valuation of $94,089,418 during the last calendar year, contrasted with imports of a value of $125,623,138 in 1931, and $147,451,158 in 1930. The great bulk of last year's imports was, of course, newsprint, receipts of which totaled in value $84,675,654, compared with $112,169,627 in 1931, while cigarette paper imports were valued at $4,141,144 in 1932, against $5,396,469 in 1931, and other kinds of paper making up the balance of approximately $5,000,000 last year. Imports of kraft wrapping almost doubled in quantity last year from 3,996,789 pounds of a value of $169,190 in 1931 to 7,237,207 pounds of a value of $221,169. Pulp board imports also held up fairly well from 23,262,937 pounds of a value of $495,453 in 1931 to 21,665,931 pounds of a value of $367,009 in 1932.

◆ Paper Stock

Imports of papermaking rags into the United States slumped to an extent where, compared with only a few years ago, the 1932 receipts amounted to practically negligible tonnage. Last year's importations were 88,434,994 long tons, valued at $1,161,315, comparing with 116,680,789 pounds of a value of $1.571.148 in 1931; 281,592,177 pounds of a value of $5,565,340 in 1930, and contrasted with 1925 or but seven years ago showing a drop of 84 per cent in quantity and 92 per cent in value from the 572,431,511 pounds of a value of $15,828,320 imported in that year.

Imports of other paper stock during 1932 totaled 84,970,166 pounds, valued at $781,356, against 123,285,085 pounds of a declared value of $1,503,180 in the preceding year, and 221,568,051 pounds of a value of $3,052,291 in 1930.

EXPORTS

The decline in exports of paper and paper products from the United States during 1932 kept pace with the fall in imports into this country, last year's exportations of all grades of paper reaching a total of $15,407,559 in value, compared with shipments of a value of $22,419,743 in 1931, a decrease of 31 per cent, and with $30,302,733 in 1930, a loss of 49 per cent. Exports of newsprint paper last year amounted in value to $447,898, contrasted with shipments abroad having a value of $604,913 in the preceding year. Strange to say, the most valuable item in paper exports from this country last year was overissue and old newspapers, shipments of which were valued at $1,472,722, against $1,538,564 in 1931. Wrapping paper exports, the next largest item in point of total value, amounted to $1,317,011 in 1932, contrasted with $1,629,216 in the preceding year.

Exports of uncoated book paper in 1932 amounted in value to $787,094, against $1,154,285 in 1931. Shipments of writing paper reached a value of $859,236, compared with $1,309,004 in 1931, while exports of surface-coated paper were valued at $677,898, against $580,346, and exports of tissue and crepe paper were valued at $554,128, compared with $505,978. Exports of box board were valued at $660,469 last year, against $1,181,853 the year before, and other paperboard shipments were of a value of $814,086, compared with $1,416,779 in 1931. Paper bag exports last year reached a value of $485,158, contrasted with $826,524 in 1931, and paper box exports were $628,046, against $931,775.

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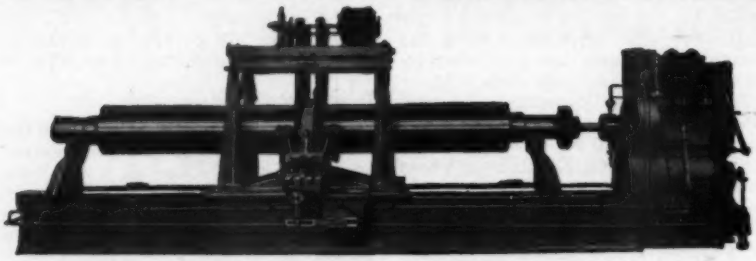

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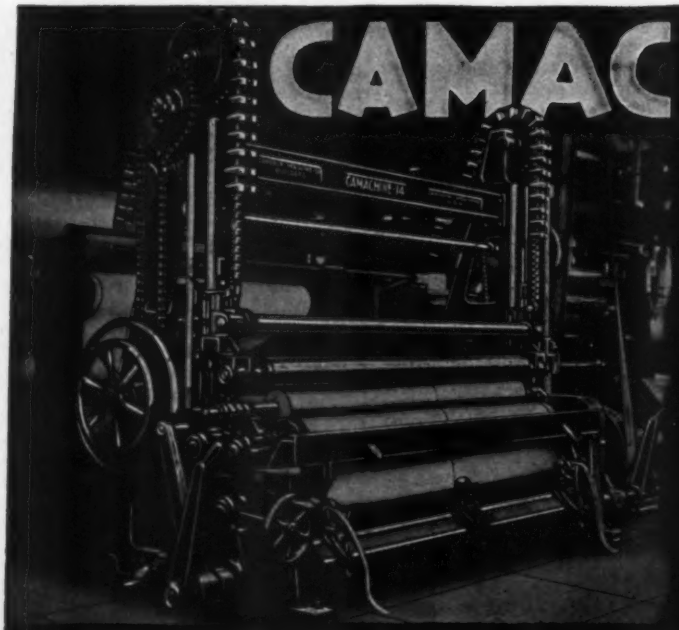

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Taylor Instrument Co.

Hygrometers
Taylor Instrument Co.

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Aurora, Illinois

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